# DOCUMENT RESUME

ED 149 980 SE 023 449

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|---|---|
| TITLE | Environmental Education, Values for the Future: Curriculum, Population, Environmental Ethics, Environmental Decisions, Economics, Ecosystems, Energy, and Technology. Packet 3-5. |
| INSTITUTION | Illinois State Office of Education, Springfield. |
| SPONS AGENCY | Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C. |
| PUB DATE | 77 |
| GRANT | IOE-551-2-75 |
| NOTE | 266p.; For related documents, see SE 023 448-457 and SE 023 459-465; Pages 6, 7, and 21 of the Technology section removed prior to being shipped to EDRS due to copyright restrictions |
| EDRS PRICE | MF-$0.83 HC-$14.05 Plus Postage. |
| DESCRIPTORS | *Curriculum Guides; *Elementary Education; *Environmental Education; *Instructional Materials; *Learning Activities; Population Education; Resource Materials; Science Education; *Teaching Guides; Values |
| IDENTIFIERS | Elementary Secondary Education Act Title III |

ABSTRACT

This booklet is one of a series in environmental education for students in grades K-12. Scientific literacy, a major goal of the program, is divided into seven concept areas: Economics, Ecosystems, Energy, Technology, Population, Environmental Ethics, and Environmental Decisions. Each of these areas represents a separate unit in the program. An introductory section gives the structure, goals, and guidelines of this curriculum program. Each of the sections is color-coded for the appropriate concept area. These sections contain behavioral objectives, appropriate subject areas, and activity options. Each option gives a listing of materials and resources, procedures, and discussion questions. There are illustrations to assist the teacher. This particular booklet is designed for grades 3-5. (MA)

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# CURRICULUM

GRADES
3-5

# ENVIRONMENTAL EDUCATION

## A THEMATIC APPROACH WITH THREE PRONGED INTEGRATION

ANTIOCH COMMUNITY SCHOOL DISTRICT 34
TITLE III ESEA

SE 023 449

The materials in this program have been developed pursuant to a Title IV ESEA grant from the Illinois Office of Education Grant #551-2-75.

The activity which is the subject of this report was supported in whole or in part by the United States Office of Education, Department of Health, Education and Welfare. However, the opinions expressed herin do not necessarily reflect the position or policy of the United States Office of Education, and no official endorsement by the United States Office of Education or the Illinois Office of Education should be inferred.

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# ACKNOWLEDGEMENTS

In the development of any curricular program the results are only as good as the background and enthusiasm of those involved. Special recognition should be given to those individuals who have been involved from the beginning: Jim Corrigan, John Estep, Mary Kern, Gil Krahn, Bob Lipinski and Diane Loughlin. They have helped to provide the necessary continuity and consistency. We also owe much thanks to Luella Anderson, Sue Baron, Paul Boardman, Sue Campagna, Art Contois, Paul Epner, Marge Girten, Judy Hebenstreit, Charles Lindholm, Lucien McLean, Sandy McDonald, Dan Mikal, Arlene Molinarolo, Evelyn Nutter, Wayne, Ochwat, Tom Sittler, Jean Soby, Jo Williams and Bob Willrett. Each has contributed to the success of the program. We should also give recognition to the one hundred and eighty (180) teachers from the following districts:

Barrington #220
Emmons #33
Gavin #37
Grass Lake #36
Grayslake #46
Highland Park #108
Highland Park #113
Highland Park #111
Lake Villa #41
Libertyville #70
Lotus #10
Millburn #24
Mundelein #75
North Chicago #64
Oak Grove #68
Prince of Peace
St. Peter's
Stevenson #125
Warren High School #121
Waukegan #60
Woodland #50
Woodland Park #110

Without their recognition of the need for environmental education in their schools we would not have been able to conduct our pilot program in twenty-two school districts in Lake County, Illinois.

Without the assistance of these people and the guidance of the citizens advisory committee we would not have been able to accomplish our objectives.

The program as conceived by Superintendent Henry C. Meyer, William Herbst, and Mary Kern owes much to Dr. William B. Stapp for the basic philosophical groundwork upon which we have built.

Special recognition should also be given to Jane Craner and Gail Dubek for the artwork which appears throughout the materials.

We are also grateful to the outside experts who evaluated and suggested the revisions necessary for the program: Dr. Carl F. Berger, Dr. Malcolm Swan, Edward Clark, Virginia Stehney, Drs. Sonia and Robert Vogl, Judy DuShane, Gene Knight, Dr. Robert Sampson, Dr. Lance Bedwell, Donn Worling, and Dr. Bruce Dalgaard. Without their commitment to environmental education we would not have been able to obtain such high quality input to our program.

Michael D. Teeley
Project Director

# PREFACE

We have organized this booklet and the teaching materials to make them as easy as possible to use. This booklet contains the basic program philosophy, an overview of all the themes and understandings, our recommendations for overcoming problems of implementation, guidelines for problem-solving, and a booklet on gaming and simulations. Additionally, we have prepared materials on field trips in Lake County, inventories of the Antioch environs, and values clarification guidelines.

You will note that the materials are divided into four grade levels; K-2, 3-5, 6-8, and 9-12. These divisions have enabled us to gear the concepts, understandings, and units to appropriate student ability levels.

We have divided the area of environmental literacy into seven major themes or concept areas; Population, Technology, Energy, Economics, Ecosystem, Environmental Decisions, and Environmental Ethics.

To facilitate their use we have grouped and color coded the materials. Each of the concept areas has a different color cover and all of the materials for that concept area are grouped in the single booklet with a single table of contents. Units may be selected from the table of contents or by using one of the indexes in this booklet.

We have also prepared the concept sheet so that you may find your particular grade level easily. Each level is highlighted in a different color on our master sheet. You should be able to see at a glance all of the understandings for your grade level.

While reviewing the materials please note the order of presentation: behavioral objective; subject areas involved; and the options themselves, three per understanding. The options are distinct and they will provide you with a variety of teaching methods. Explicit directions should make it possible for every teacher to make environmental education part of their teaching.

The pilot program has shown that the modified materials are very easy to use and provide a variety of experiences which integrate environmental education concepts into the existing subject matter. All that we ask of you, the classroom teacher, is that you expend the time and energy needed to select the activities which suit you best.

Environmental education cannot wait and we have attempted to facilitate your involvement.

# INTRODUCTION

Since the industrial revolution man has found himself able to govern an increasing number of variables in his daily life. Each new "advance" has brought additional comforts and protection from the vagaries of an often harsh environment. Until the twentieth century, the rather slow rate at which technology brought about changes in lifestyle made it possible for man to comprehend and adjust to the changes. In the twentieth century world population has doubled. There has been a four-fold increase in the people and land in cities, social and technological changes, and environmental pollution have increased at a pace often too difficult to comprehend or even measure.

In 1970 there seemed to be an awakening of a significant portion of the population to the scope and nature of the problems to be faced. Teach-ins, rallies, resolutiosn, and commitments all indicated that people were alarmed and eager to work to resolve the problems of our environment. When the emotion of the period died, there remained relatively few individuals and groups with a long term commitment to dealing with the problems.

Now that the work of these few individuals is resulting in legislative action, new enforcemnt standards, and conflicts between economics and ecology, more people are being forced into action. Individuals must weight the cost of pollution control equipment, as seen in higher priced cars, electricity, and other manufactured goods, against the benefits of cleaner air and water.

To make informed and consistent decisions every citizen must have the opportunity to gain the insights and experience only a strong environmental education program can offer.

To this end, Antioch Community Consolidated School District 34, Antioch, Illinois, working under a Title III ESEA (now Title IVC) grant has developed a kindergarten through high school (K-12) environmental education program.

In the earlier grades the program focuses on heightening student awareness of the world around them and increasing their sensitivity to the interactions taking place there. Their new awareness is used to help them to begin to understand their place in the environment and the importance of each aspect of our world.

As the child progresses through the program in the elementary grades this interest and awareness is utilized to help them begin to understand the intricacies of the many interdependencies and changes taking place in the environment. They also begin to get a feeling for the scale of their world and their place and responsibilities in it.

At the junior high level activities focus on the integration of content with the roblem-solving skills necessary to put their developing environmental ethic into meaningful action.

During high school, activities are designed to refine their problem-solving skills to enable them to handle the problems of trade-offs and the increasing complexity of large scale community problems.

# PROGRAM GOALS

The broad overall goals of the program are to create student-citizens who:

* possess a vital interest in their environment,
* are sensitive to even subtle changes in the quality of this environment,
* are able to understand, analyze, and evaluate problems,
* are skilled problem-solvers and
* are motivated to act in the resolution of environmental problems.

Within these broad goals a number of supporting objectives and approaches have been established:

* Increase student sensitivity to the environment through firsthand discovery and inquiry.
* Increase student interest in the environment by integrating environmental education into existing subject matter on a regular basis.
* Increase student knowledge in areas that are necessary for participation in the resolution of environmental problems.
* Increase the ability of students to recognize existing and potential problems in the community.
* Increase student problem-solving ability through carefully monitored personal problem-solving experiences.
* Increase student motivation and desire to become involved in the affairs of the community through successful experiences with community action activities.

# PROGRAM STRUCTURE

For any educational program to be effective it must clearly identify those components of learning which will be part of the program. We have identified three principle areas of concern for our program:

COGNITIVE - The factual information related to understanding man's interrelationship with the environment. An environmentally literate citizen should be capable of understanding the broad areas of concern associated with environmental issues and problems. The program structure is designed to relate separate disciplines to each other as they relate to developing an understanding of the scope of environmental issues.

AFFECTIVE - The emotional response of individuals to their environment. For an individual to be consistent in his response to environmental issues he must have a thoroughly thought out system of values. An important aspect of the program is the provision for numerous opportunities for the student to evaluate and modify his values to ensure a value system consistent with individual and societal needs.

PROBLEM-SOLVING - This action component integrates cognitive and affective areas into meaningful activities. To solve environmental problems we must have a citizenry that is not only knowledgeable about the environment but motivated and skilled in dealing with problems. The problem-solving component develops the skills and provides the reinforcment necessary for students to become involved in environmental issues.

To facilitate the development of these components we have structured the program in the following manner:

- Spanning and integrated into the existing grade levels and subject areas.
- Linking subject areas that relate to environmental concerns (interdisciplinary approach).
- Emphasizing the role of the student in the learning process.
- Placing emphasis upon the role of the individual and the need for examination of individual attitudes and values.
- Providing opportunities to develop the critical thinking and problem-solving skills necessary for action.
- Emphasizing social change strategies and the necessity for removing emotion from problem-solving.
- Focusing on the local environment and resources, while not neglecting regional, national, or world issues.
- Emphasizing the future of man and societies.

As the students move vertically through the educational process, K-12, the curriculum will incorporate the above points and aim for a strongly integrated and cumulative program that develops students within our overall program goals who are:

sensitive to and aware of the environment,

interested in and motivated to become involved in usses,

skilled critical thinkers able to recognize the root cause of problems and

skillful problem-solvers.

# CONCEPT AREAS AND UNDERSTANDINGS

The environmental education program has identified seven (7) major concept areas and one hundred sixteen (116) understandings aimed at K-12 competence in each of the seven concept areas. These understandings will assist both teachers and students in identifying important understandings related to environmental education. Briefly, the seven concept areas and their foci are:

ECOSYSTEMS - In any program for environmental education it is necessary to develop an understanding of basic ecological principles. All other concepts are dependent upon the student understanding the rules governing the operation of the total system.

We begin with the basic structural aspects of ecosystems, including component identification. From this we progress to explorations of their orderliness, interactions, and complexity. These are then incorporated into investigations of energy needs, a source, its storage, and the different forms of energy needed. The ecosystems are then analyzed to determine how energy is used at various points in food chains.

All of these aspects are then examined to determine the effect man has had on ecosystems and how our role must be altered.

POPULATION - To understand the scale of the problems to be dealt with, students must understand population principles. Any and all solutions to problems must deal with a scale governed by the population affected.

For the youngest student we begin by defining a population and its component parts. We then explore the differences and interactions of a variety of populations. Upon this foundation we build understandings of the rate of growth and change of populations, the factors affecting changes and the past, present, and future of world populations. Students then explore the variety of alternatives available to us as we attempt to maintain or improve our environment on a worldwide basis.

ENERGY - One of the inescapable problems facing the world today is meeting present and future energy needs. Students must understand the source of energy, its forms, and the transformations necessary for us to use energy.

The program deals with the laws of thermodynamics in both the classical and practical sense. The student is shown the growing need for energy and the problems associated with each of the alternatives. Activities also focus on the time lag associated with bringing energy to the consumer in a form which is usable.

The most important aspect of the energy understandings is the recognition of the need for energy conservation. Conservation will help us to delay the effects of energy shortages while we are developing the clean forms of energy necessary for achieving the United States' goal of energy independence and environmental quality.

TECHNOLOGY - With the rapid advance of technology in recent years there has been a concomitant increase in our dependence upon technologists. Without an understanding of the multiple effects associated with any application of technology we are likely to begin a cycle of events with far-reaching undesirable consequences, as in the case of pesticides.

The technology understandings begin by examining labor and waht we receive for our efforts. Students then examine the changes which have taken place and the influence of these changes upon our lifestyle. This is then examined for the effects of technology on our use of resources. The student then examines the role of technology in determining our needs and the social costs associated with meeting these needs. The culmination of this topic is the identification of the role of the individual in identifying the trade-offs and concessions to be made in the adoption of an environmentally acceptable lifestyle.

ECONOMICS - For any individual to become involved in environmental issues he must understand the basic principles behind our economic system. It is an inescapable fact that when the issues can be shown as being ecology versus economy, ecology will be the loser.

To sort out fact from fiction the individual must understand trade-offs, political economics, principles of maximizations, and the manner in which industry is able to amortize its costs over time to minimize the effects upon profits and lossess.

In the same respect, the individual must understand the need for a sound economy with sufficient jobs and capital. The student must investigate and be able to explain environmental issues in terms that make sense to all interest groups.

ENVIRONMENTAL ETHICS - For the student to effectively participate in environmental problems he must be convinced that his actions are consistent with the goal of a better environment.

The understandings incorporated into the environmental ethics materials encourage the student to examine his attitudes and values as they relate to this broader goal. The units provide exercises and tests of both individual and societal values.

These materials are designed to reinforce a value system oriented toward stewardship as opposed to use of the environment. Through the normal progression of the program the student examines, applies, re-examines, modifies, and reapplies his values as they relate to his environment. During this development process the student also broadens his perceptual framework to include the divergent value systems of others as they relate to the variety of societies within our ecosystem.

ENVIRONMENTAL DECISIONS - The singular most important segment of our program is the area of environmental decisions. This area brings together, in an action phase, all six of the other concept areas.

This action phase relies on the factual information assimilated in the other areas for the active process of making an effective environmental decision.

The student learns the problem-solving process and puts it to the test in real and simulated decision-making situations. This process integrates the content, the trade-offs, and the values discussed in the other six areas.

Within each of these seven areas the understandings and the teaching units developed for them have been divided into four major grade groupings, K-2, 3-5, 6-8, and 9-12. Each of these groups is designed to make it possible for a given unit to be utilized at more than one grade. This permits the individual teacher to deal with students of different abilities and at the same time limits the possibility of needless repetition of material. Additionally, each unit is designed to be used in more than one subject area and the most applicable areas are noted.

# CONCEPT SUMMARY SHEET

| | ECONOMICS | ECOSYSTEMS | ENERGY | TECHNOLOGY | POPULATION | ETHICS | DECISIONS |
|---|---|---|---|---|---|---|---|
| **K-2** | Money sources<br>Money distribution | The source of energy<br>Ecosystem definition<br>The food chain | The source of energy<br>Needs for energy | Responsibility for work<br>Necessities and luxuries<br>Effects of technology | Animals, people and plant communities<br>Interaction and stress<br>Satisfaction of needs | Needs of people<br>Interactions within societies<br>Values and society<br>Scientific discovery | The nature of choices<br>The responsibility for decisions |
| **3-5** | Income sources<br>Economic sources<br>Supply and demand | Ecosystem place<br>Ecosystem energy<br>Ecosystem interactions<br>Pollution and ecosystems | Users of energy<br>Forms of energy<br>Conversion of energy | The effects of technology<br>Influence of technology of lifestyle<br>Rate of technological advancement<br>Lifestyle and natural resources | Predictable population cycles<br>Effect of lifestyle on environment<br>Checks and balances in nature | The effect of lifestyles of the environment<br>Human attitudes and environmental harmony<br>Stewardship of the Earth | The nature of sound decisions<br>The personal nature of decisions<br>Consequences of decisions<br>Time factors and decisions |
| **6-8** | Standard of living<br>Economic systems<br>Environmental economics | Ecosystem complexity<br>Forms of energy in ecosystems<br>Energy transfer in ecosystems<br>Capacity for stress in ecosystems | Varying energy needs<br>Energy losses<br>The energy problem<br>Energy forms | The effect of technology on environment<br>The timeline of technological effects<br>The effect of lifestyle on resource demand<br>The effect of demand on the manner of resource use | Origins of population<br>Standards of living<br>Population interactions | Preservation of the natural order<br>Man's role in the world<br>The environment and psychological well-being<br>Meeting future needs | Complexity of decision-making<br>Effects of decisions<br>Decision makers<br>Enforcement of decisions |
| **9-12** | Economic systems<br>Environment and economics | Ecosystem dynamics<br>Ecosystem structure<br>Humans and ecosystems | Energy use<br>Energy transformations<br>New problems<br>New solutions | Influence of demand on cost<br>Social costs of technology<br>Technology and trade-offs | Characteristics of populations<br>Population diversity<br>Impact of population growth on resource use and the environment<br>Social implications of populations | Diversity of natural surroundings<br>Implementation of ethics<br>Quality of life and social justice | Scope and aspects of decisions<br>Decision-making and personal values<br>The role of the group in decision-making<br>The effect of laws on environmental decisions |

# IMPLEMENTATION GUIDELINES

Possible objections to Environmental Education and responses to these objections:

1. Objection

"This program is likely to get us away from the teaching of fundamentals."

Response

The three R-s cannot function in a contaminated environment. Furthermore, in a multi-disciplinary program the teaching of basics can actually be made more meaningful through their application to environmental issues and aspects of the children's world of interest to them.

2. Objection

"I have a required curriculum to cover. I can't work in any more material."

Response

In most cases this program can be used without time loss. These units are designed to teach curriculum concepts that are already required in most system. Here, however, the emphasis is on the environment. It is true that some of the options require more class time than others, but in these cases more than one concept will be covered. Furthermore, the Illinois legislature has decreed that Environmental Education be implemented throughout the state; and this program, it should be noted, has been approved by Title III ESEA.

3. Objection

"Our class periods are too short to accomodate a program of this kind."

Response

Many of the options can be easily covered within a single class period of average length. Where more than one period is required, the transition from one day to the next will present no more of a problem than it would in any other subject area.

4. Objection

"I'm afraid that the preparation time will be prohibitive, and I'm already overworked."

Response

Most of the preparation has already been done. In many instances a careful reading of the directions is the only preparation necessary. It time permits, of course, the teacher may choose an option that requires more extensive background study or the assembling of a greater number of materials. The choice is his.

5. Objection

"This program does not apply to my subject areas."

Response

Environmental Education deals with more than air and water pollution. It is concerned with the relationship between living things and their total environment. In the case of man, for example, the environment can be physical, economic, political, cultural, and the like. In other words, Environmental Education embraces virtually all areas of formal study.

6. Objection

"That's all well and good, but where the community aspects of the program are concerned, I would be at a disadvantage. I'm simply not that familiar with our local resources."

Response

Resource handbooks have been included in our package. Each school system is encouraged to develop its own handbook of local resources, using the Antioch handbook as a guide. Chambers of Commerce, sewage treatment specialists, police departments, recreation directors, and others can be very helpful in the compiling of such a booklet. If a school system is seriously interested in pursuing environmental studies, it should undertake the writing of its own resource manual at the earliest opportunity.

7. Objection

"What if I am absent? Will the substitute teacher have difficulty teaching these units?"

Response

These units should present no more difficulty for the substitute teacher than any other unit would. In fact, the procedures in these options are normally more detailed than those found in most lesson plans.

8. Objection

"It looks to me as though the format of these units provides for very little variety in method."

Response

The order and symmetry of the printed format is misleading. A closer examination will show that the total package calls for the utilization of all standard modes of instruction:

Lecture - demonstration
Questions - discussion
Drill and practice
Audio-visual
Problem solving and discovery
Laboratory - inquiry
Creative response
Role playing - simulations
Independent study - research

9. Objection

"Some of the understandings are unclear."

Response

If the teacher is familiar with the terminology of the understandings, he should have no difficulty in comprehending them. If, after such familiarity is established, an understanding is still confusing, we would appreciate having this brought to our attention for possible revision.

10. Objection

"I doubt whether my students are mature enough to make judgments of the type called for in most of these units."

Response

This is, of course, a genuine concern. However, the only way to foster mature thinking is to place the student in situations that require clear thinking. To this end we have included a values clarification booklet. This set of materials is designed specifically to sharpen student perspective, and this is where mature thinking must start.

11. Objection

"I question any program that tries to teach a system of values. Values are frequently subjective."

**Response**

These exercises are not designed to impose a value system upon the student but rather to help the student clarify his own values through carefully planned activities.

12. **Objection**

"Some of these options deal with controversial issues. I'm not sure that I would feel comfortable exploring these areas."

**Response**

Each teacher must decide for himself whether a given option is too controversial to be handled effectively in his district. The simple expedient of choosing a different option will normally enable the teacher to develop the understanding without colliding with local restraints or customs.

13. **Objection**

"I cannot encourage my students to become openly involved in community controversy. Because the members of the board of education are fearful of irritating their constituents, they would never permit students to question the city council or the chamber of commerce on such issues as waste disposal, pollution, landfill, or the like."

**Response**

One of the major objectives of an educational institution is to foster respect for the demoncratic process. As directors of such an institution, board members should be among the strongest backers of constructive democratic action. Our exercises are consistent with the goals of public education. If you follow the problem-solving guidelines you will not offend your board of education.

14. **Objection**

"We have a tight budget. I doubt whether we can afford to purchase the materials."

**Response**

The actual cost of the units is very small, and most of the options can be taught without additional cost. The purchase of games, filmstrips, and cassettes can be gradual. The district may expand its total supply of materials as finances permit, or modify the use of those already available.

15. Objection

"Without updating these materials will lose their effectiveness within a very few years."

Response

For the most part these units are conceptual rather than topical. To this extent the core of the program is not "dated". It is understood, of course, that individual teachers will continue to modify these materials over the years in order to keep them "fresh". In fact, totally new units might be added from time to time as the need for them arises.

16. Objection

"It seems to me that it would be extremely difficult to evaluate student progress in a program that is so subjective."

Response

Numerous evaluation tools are included within the individual units. There are discussion questions, theme topics, and pre and post tests. Also included are pre and post tests designed to span years of instruction. Personal values are no more difficult to deal with here than they would be in a typical Humanities class.

17. Objection

"The evaluation of the whole program, however, will be more complex. I am not sure I will know where to start."

Response

Carefully constructed evaluation forms have been included within the package. They should be quite adequate for the purpose.

18. Objection

"General resistance and apathy could seriously hamper our ability to implement this program."

Response

To fight resistance and apathy on the part of the community, the administration, the teachers, or the students, a number of steps can be taken:

Community

1) Send an information letter during the first week of school to inform parents of their son/daughter's involvement in the Environmental Education program.

2) Hold evening parental information sessions early in the school year to inform and involve the parents.

3) Encourage teams of parents, students, and teachers to become involved in community-based encounters.

4) Send newsletters to parents informing them of future field trips and progress being made in the program at their school.

5) Whenever possible work through community organizations on publicity and resources.

Administration

1) Clarify the position of the administration toward environmental education to determine how firmly they are committed to the environmental education program.

2) Hold information sessions for all administrators to update them on the environmental education program and to establish a feedback and evaluation network at the administration level

3) Investigate the possibility of more flexible scheduling where necessary, i.e. year-round school, team teaching, modules, etc.

4) Develop a more reasonable field trip policy for schools involved in the environmental education program.

Teachers

1) Enumerate and clarify the long-range goals and sub-goals of the environmental education program.

2) Provide a staff co-ordinator to assist teachers in the implementing of the total environmental education program.

3) Co-ordinate requirements of other programs with the needs of the environmental education program to avoid duplication of field or encounter experiences.

4) Provide teachers with financial remuneration for attendance at workshops.

5) Keep the community well informed on the objectives of the program in order to allay teacher concern over the discussion of attitudes and values.

Students

1) Let students make choices. Help them to establish a positive vested interest in their school and community.

2) Provide students with problem-solving opportunities, by letting them choose the areas they wish to investigate and by encouraging encounters in the field.

3) Help the students use their experience to build upon classroom concepts.

4) Help the students develop greater perspective in the implementing of change strategy.

# GUIDELINES FOR PROBLEM SOLVING

Realizing the importance of problem-solving to our environmental education program, we must first delineate some guidelines to be observed in order to be truly effective in the community. These guidelines are not intended to restrict problem-solving but to aid in the tactful and educationally productive involvement of students in school and community affairs.

The structure for effective problem-solving can be seen as a six step process with a seventh, evaluative step added for educational purposes.

## DEFINE THE PROBLEM OR ISSUE

This step, while not the most difficult, may be the most important phase of the entire effort. We must clearly define the precise issue and not the symptom of the problem. We should not permit ourselves to get lost in an emotional approach to a symptom and in the process overlook the root cause. The role of the teacher at this point is to maintain the educational analytical attitude toward the entire process. Problem-solving is not a diversion, but a learning experience that is part of the regular school program.

> The local government wants to place a sanitary landfill in a marsh west of town but in the village limits.

## BECOME INFORMED

This can be both the most laborious and most interesting phase of the process. During this phase students must learn about all sides of the issue and, using critical thinking processes, attempt to separate fact from fiction. This may mean using a variety of information sources from technical reports to firsthand interviews of citizens. A note of caution at this point. If the most effective means of data gathering means bringing in experts or going out in the community, be certain that you have cleared this with the administration beforehand. In public institutions we must be aware of the dangers involved in dealing with controversial issues. Be certain that your purpose is clearly defined and the program carefully monitored. An important aspect of problem-solving is sensitizing the problem-solvers to the attitudes and mores of the community. Also, if the students will be conducting surveys in the community, be certain to publicize the event well in advance and clearly identify each student so that they are expected and are not seen as intruders. It goes without saying that the structure of the questions and the appearance of the students should also be carefully considered.

AGAINST

1. People near the site don't want it because it is noisy and they think unsightly.
2. The local conservation group complains that the marsh is a good hunting and fishing place and they don't want to lose it.
3. Local residents downstream are afraid the loss of natural drainage will cause flooding.
4. Research shows the exact dangers of landfill are not completely identified.
5. County health officials say there is danger to local wells if the site is not made properly.
6. The county soil conservation district says the site is unsuitable for a landfill.
7. Research shows the landfill takes five to ten years to cause damage to water supplies, if at all.
8. Government offices oppose the site if any better site is available. Site availability is left up to the village officials.
9. The local area is part of a large state and federal program to clean up local bodies of water.

FOR

1. The company running the site is one of the largest and best in the country.
2. The company will give half of the site to the city for a park when finished.
3. The village trustees feel the site is the best one for their needs.
4. There is no conclusive data proving pollution.
5. The village needs a site close to town for dumping wastes.

6. The closest site is more than eight miles from town.

7. Surveys of residents show most care very little about the issue.

## IDENTIFY POSSIBLE SOLUTIONS

Once the students have a well-defined, well researched problem, they should be able to identify some potential solutions that will have a degree of merit. Some of these may be more functional than others but they should in some manner remove or eliminate the problem. At this point you should use value clarification strategies to begin to rank order these alternatives prior to final selection and development of a plan of action.

1. Close the site and force the users to find a new site.

2. Clean up the site and give them permission to operate under close control.

3. Expand and manage the site and deal with flooding and pollution when and if they occur.

4. Give the operators six months to develop enough facilities to eliminate problems.

5. Close the site and negotiate a new contract for an alternate site at higher cost.

6. Educate the community on ways to reduce garbage and close the site and use an alternate site.

## SELECT AMONG ALTERNATIVES

At this point the students are going to select what they feel is the most efficient and tactful solution to the problem at hand. Be certain that you have decided on a plan of action that "fits" the community. Long lasting and effective change occurs only when the solution is accepted by the group(s) affected. The solution must also fit the capabilities of the students involved in implementing the plan. At this point you may find you have two or three plausible alternatives that may be equally effective. If this occurs you may want to select more than one and develop a comparative study to maximize your chances of success.

Among the six alternatives identified, there were only four with any long range merit. These were ranked according to what the students felt would have the most benefits for the community.

1. Educate the community on ways to reduce garbage and close the site and use an alternate site.

2. Give the operators six months to develop enough facilities to eliminate problems.

3. Clean up the site and give them permission to operate under close control.

4. Close the site and negotiate a new contract for an alternate site at higher cost.

The choices each have good and bad aspects that must be dealt with. The best alternative based upon community attitudes seemed to be #1. This was also the alternative the students felt best equipped to handle.

## DEVELOP AN ACTION PLAN

To really bring the process to fruition you should make a point of developing a plan to implement the selected alternative. This is the format for the public action phase of the process and should be carefully laid out to consider the resources and abilities of the students as well as the community affected by the plan. Also be certain to involve as many community groups as possible.

The main aspect of the plan selected requires that the community be shown ways to reduce their garbage output so that the higher cost of the new disposal site will not be felt by the taxpayer.

The educational program will focus on local newspapers and the schools. The points of the plan are:

1. Encourage consumers to use returnable bottles.

2. Start a program to recycle glass.

3. Organize a program for regular paper drives.

4. Provide homeowners with information necessary to start home compost heaps.

5. Encourage and organize homeowners to recycle tin and aluminum cans.

6. Provide incentives for reducing the amount of waste picked up at the home.

## IMPLEMENT THE PLAN

The implementation of the plan is usually the easiest step in this process, providing the first five steps have been well done. It is also the most rewarding for those involved. This phase produces publicity and elicits public reaction to the students, the school, and the teacher. If you have carefully monitored and assisted the students and everyone has done their job you will find that the overall reaction will be positive.

> Everyone is involved in the implementation of the plan. Students prepare new releases for the local papers. They prepare a number of posters for reminders of recycling and the program goals. The village board prepares a resolution to encourage recycling. Local businesses make more returnables available. The local newspapers publish reminders to the public.

## EVALUATE THE PROCESS

This step is optional due to the possibility that an on-going evaluation may have been taking place during the first six steps. However, because this is an educational task with an educational objective it may be especially productive to review the process which took place and to point out the strong and weak points in the approach. Carefully done this can help to encourage further activities and produce a more educationally rewarding product.

> The students must evaluate their program. This usually takes the form of written and/or verbal means. It is best to keep this time open and let the students air their differences.

Throughout the problem-solving process we should be aware of the real purpose behind having students become involved in community affairs. We are not trying to correct all the wrongs of the community or to pinpoint blame. Our major goal is to help students to become effective, highly motivated and highly skilled problem-solvers. This may take many field experiences or one, but each experience should be carefully structured within our educational goals.

# GAMING AND SIMULATIONS

# INTRODUCTION

One of the most difficult problems for educators is the type of approach to be taken in introducing subject matter. Stimulating student interest, holding that interest, and leading the students to ask beneficial questions are aspects which the teacher should always keep in mind. A solution to this dilemma is achieved through the use of games in the classroom.

The connotations of the word "game" create within the students an immediate interest and enthusiasm not elicited by many of the other types of learning activities. The teacher benefits from the start. He further benefits by seeing the participation of students who normally may not get involved. A by-product is the marked reduction in student behavior problems.

The picture is not completely one-sided. Disadvantages do exist but in most cases they are outweighed by the advantages. Depending upon the type of game all students may not be able to play at one time. Noise level in the classroom may become high even though this noise is due to participation not the lack of it. Other advantages and disadvantages depend upon the type of game being played.

At this point we should explain what games are. Many different definitions of games are available. We shall consider a game any activity involving one or more players that has a fixed set of constraints placed upon the players with a specific goal or goals in mind and some sort of end point. The number of constraints may vary from a loosely structured game to a highly structured game. In the latter a pre-determined outcome is predictable with little or no thought required of the players for that outcome. The learning in this type of game takes place in the ensuing discussion. The specific educational purpose may be anything from a general objective for the game to a specific end point to the game. In the former type an end point exists although it is not easily determined and this end point can vary each time the game is played. Clearly, there is a great amount of variety in the types of games on the market.

We feel that the benefits of games may have been overlooked as a source of learning. They may afford just the approach educators have been looking for. Direct student involvement makes student feel more comfortable in handling new topic areas and removes inherent fears of facing unexplored materials. We believe that one of the best ways to learn about a topic is to "live" through the experience; games provide these experiences in a safe, practical, enjoyable and usually economical manner. It is the purpose of this booklet to bring teachers up-to-date on educational games; the different types available; the advantages and disadvantages of each type; and short descriptions of actual games on the market.

## TYPES OF GAMES

The simulation game can be used to do three major things - (1) present information; (2) elicit responses or provide a situation for practice; (3) assess performance and evaluate feedback. Within the scope of these parameters lie a number of advantages and disadvantages which the classroom teacher should be aware of.

Advantages of simulation games are numerous and they combine the great appeal of relevance with immediate feedback for the student. In the laboratory setting he may encounter real life conflicts in microcosm and learn to deal with them intellectually. The game makes certain social phenomena more observable to the student. Alternative courses of action are tried and discarded by him. Implications of these actions may immediately be discussed. Choices are weighed and tested. Rational decisions are fostered above emotional reactions. As such, the game is especially well suited to the decision-making process in the classroom. Real-life situations may be compressed within the time and space of a class period. Perhaps the leading characteristic of the simulation game is its ability to bring about high student motivation. Classroom teachers tend to value this advantage most highly, as so many positive student behaviors follow from it.

There are a number of disadvantages to be considered. Students may focus on the game element itself rather than upon the concept it is meant to reflect. Following from this idea is the criticism that simulation games oversimplify real life situations. Simulation games are frequently time consuming and may require teacher training. However, properly trained teachers with a willingness to devote adequate time to play and discussion will eliminate most of the disadvantages listed above.

The other large category of classroom games being marketed is non-simulation games. This term covers a broad range and generally refers to games in two specific ways: Many are not open-ended or they are open-ended in a uniquely different way. There is a specific plan to them and a pre-determined manner in which the game should be ended. Non-simulation games are played in accordance with the rules of a given subject area. For example, a math game would be played by the rules of mathematics. The subject area most often imposes its own structure in non-simulation games. The rules, then, do not simulate the rules of the subject area - they are its rules.

The advantages of this type of game are like those typical of the first category - highly motivating, relevant, and capable of leading the student through the decision-making process. Students who have failed at regular classroom activities, often find success in playing non-simulation games.

There are several disadvantages to this type of game as well. The teacher must have a thorough knowledge of the rules involved and must be an effective guide to the students. The familiarization process may take time. The playing time of the game may also be long. If this specific amount of time cannot be allotted, the success of the game may be jeopardized. These disadvantages may be overcome by careful planning. A more difficult problem to cope with is that of the student who tends to over-emphasize winning above all other objectives in the game. Without the care and sensitivity of the teacher in this matter, the educational value of the game may be overlooked.

Simulation and non-simulation games may be presented in a variety of ways. Some are played on a board; some are not. The format and equipment of a game, the number of players who may play, and the roles of these players will depend upon objectives and rules of that game. At this point we should briefly mention role-playing in more detail. There are three basic types of role-playing commonly used by simulation and non-simulation games. The first is free-form role play. No specific roles are assigned. The players are free to pretend to be whomever they wish. The second is limited role play. Specific roles are assigned to the player, but personality characteristics are not specified. Players might have such roles as laborer, sea captain, father. The third is assigned role positions. In this category the role specifications detail what kind of person inhabits the given role, for example: Laborer - with a grudge against management. In most games in which role-playing is used all players know what the assigned roles are and which players possess them. In some games, however, a person may be assigned a role which only he knows about. This is a source of mystery to the others in the game and, as such, may invoke distrust and outright hostility from his team members.*

If role playing is used in a game, it is used to serve the objectives of that game.

Besides becoming familiar with the many available educational games and their uses, teachers will benefit from learning to design their own games. Through a formula of specific steps most classroom objectives may be built into a game which will apply directly to a given classroom and the specific needs of a given group of children. Game design may be developed by adherence to these steps:

(1) Statement of the overall objectives to be taught;

(2) Determination of such elements as duration of the game and issues to be covered;

*This type of role play would be uniquely that of a catalyst.

(3) Identification of the individual groups or organizations who will be making the critical decisions;

(4) Determination of players' objectives - power, wealth, influence - in the context of the game;

(5) Determination of the players' resources - physical, social, economic, political, informational;

(6) Determination of the desired flow of resources and information to and from each player;

(7) Statement of what criteria or decision rules will decide how information and resources will flow among players;

(8) Identification of outside forces on the roles of players (Example: No violence permitted in competition among Quakers.);

(9) Formulation of scoring rules;

(10) Choice of form for presentation and manipulation of players' actions (board game, role play, paper/pencil exercise, computer simulation) and the sequence of operations to be used.

We suggest that both teachers and students become involved in the creation of new games or in the modification of old ones.

In order to further acquaint teachers with game models, let us give a detailed description of one representative game from each major category. Teachers may follow through the game procedures and analyze for themselves the outcome.

Planet Management is an example from the first category, simulation games. This simulation makes use of a "programmed data bank" that determines the composite results of the manipulations of the management factors on a closed planet. Players are able to "manage" the budget of the planet and allocate resources in a manner which they feel will effectively develop the planet. Within the structure of the game time is compressed and data from succeeding rounds is displayed graphically so that the students can evaluate the success of their various decisions. Simulations of this form are very close to computer simulations. However, they avoid the mystery and expense of the computer while at the same time providing the variables of the computer program. These games are extremely successful due to their ability to be used by entire classes and to the minimal amount of time required to set them up and play them.

Community Planning Map is an example from the second category, non-simulation games. This open-ended game revolves around an 8'x8' vinyl floor map of the Toledo area. The major features of the area, rivers and expressways, are painted on the scale map and students, generally elementary, construct their own city around these features. This enables the students to show what they would put into a city and to explain why they think the separate components belong where they put them. This has the advantage of not forcing the students to follow any set pattern and also causes them to ask questions about the nature of their community. Once a community has been built, perhaps over a period of many days, the students are able to compare it to their community. Games of this type are very well suited for elementary grades because there are no rules and students can use their imagination and develop their powers of observation while at the same time learning about their community.

Redwood Controversy, a role-playing game, is an example from a third category, containing properties of both simulation and non-simulation games. Redwood Controversy involves students in the resolution of a land-use problem in a small community. To complete the game the students must assume roles and, within the constraints of the roles, attempt to persuade others to adopt their position. Within the structure of the game the teacher can expect students to gain firsthand experiences in the areas of government, language arts, environment, biology, and communications. The open structure of these problem-solving games enables the teacher to bring in subject matter over long periods when students are at an impasse or to run the game in a single class period. These problem-solving games can be considered good starters for students about to become involved in problem-solving activities in their community. They can also be utilized to introduce a new subject area or the need for a new area of content.

These in-depth analyses of three games may serve to explain the basic game categories and to complete our discussion of the potential uses of games in the classroom. A more extensive game inventory follows. In conclusion, we recommend the use of gaming and simulation in the classroom as an alternative to traditional classroom methods and as one of the best ways of involving students in the Environmental Education Program in low-risk problem solving.

**Balance** INTERACT

| | |
|---|---|
| Grade: | 5-College |
| Time: | Three weeks for one hour each day |
| Players: | An entire class |
| Format: | Balance simulates the value conflicts facing the American family in dealing with the environmental crisis in our cities, by means of role-playing. |
| Concepts and Skills: | The ecosystem concept, socio-cultural attitudes, critical evaluation of the extent of the environmental crisis and information retrieval and utilization. The game format also builds communication skills through individual presentation. |

**Business Strategy** AVALON HILL

| | |
|---|---|
| Grade: | 6-12, Adult |
| Time: | 2-3 class periods (12 game months) |
| Players: | 2-4 players |
| Format: | The Banker gives each player, including himself, $10,000 in cash, four pawns of the same color and one sheet from the Running Record pad. Climate situation cards are shuffled and placed face down on the playing board. The game consists of 12 turns, each representing one month. The winner is the player with the most cash on hand at the end of the December turn. |
| Concepts and Skills: | This game exposes the business world for what is really is. It parlays native shrewdness, common sense and proper management principles into the most relaistic game of its kind. It shows how to control the economy, how to protect yourself during labor strife, how to combat consumer boycott, how to avoid texes (legally) and how to be successful in business. |

**Clean Water** DAMON

| | |
|---|---|
| Grade: | 7-12 |
| Time: | 1-2 hours |
| Players: | 2-4 |
| Format: | This is a board game designed to teach basic ecology through role-playing and problem solving. |
| Concepts and Skills: | The basic ecological principles of an aquatic system and city planning related to the system are emphasized. Players learn the relationshps of various parameters upon an aquatic system. |

**Clug** UNIVERSITY OF MICHIGAN
ENV. SIMULATION LABORATORY

| | |
|---|---|
| Grade: | 6-12 |
| Time: | 3 hours initially and one half hour for subsequent play sessions |
| Players: | 15-30 |
| Format: | This is a board game with greatest emphasis upon role-playing and interaction. |
| Concepts and Skills: | The game can be used to teach community land use, history, sociology, human relations, almost any area focusing on the city. |

### Communities in Nature (Ecology Learning Module)

SVE

**Grade:** K-2

**Time:** Variable - This module may be employed as a full unit or portions of it may be used as supplementary to other science material.

**Players:** This module may be used by individuals or in small or large group instruction.

**Format:** The kit combines two games, eight sound filmstrips, four murals with vinyl adherents, one food chain chart, one food web chart, vinyl chart adherents, student discovery booklets and data sheets. The kit is a total learning experience with clearly worded teacher manuals to use as guides.

**Concepts and Skills:** The primary concept taught is that a community is made up of living things that affect each other. Related topics are distribution of energy through food chains and webs, community balance and the roles of plants and animals in communites.

### Compacts

INTERACT

**Grade:** 9-12

**Time:** 5-6 hours

**Players:** 30-40

**Format:** This is a simulation game which includes a Black Board and location of a Wall Newspaper. It might also include a portable P.A. System used to simulate radio or television news broadcasts. It also requires a Leader's table with issue cards, resources box, chance and unanticipated consequences cards, extra ART and proposal forms, additional instructional materials, badges, Community Directory, etc. Finally, it also includes a Mayor table with badges, role description sheets and sample forms. One might also use a table for coffee or other refreshments.

**Concepts and Skills:** Compacts has been used as a rehabilitation planning game nationally to train Federal and state administrators and planners. Compacts has been widely used as a "priming" game in many settings. Compacts has been successfully redesigned by participants to deal with neighborhood action; juvenile programs and the administration of criminal justice; community mental health; and community development.

## Cope

INTERACT

Grade: 6-12

Time: 20 periods of fifty minutes each

Players: An entire class

Format: Cope simulates five future time periods in an imaginary think-tank city. After examining the problem of coping with change, students experience the stresses and anxieties caused by rapid change. Working to accomplish many tasks and to solve several problems, they face a future world's technology that is changing so fast that they have trouble keeping up with it. By the end of the simulation, students realize that the future is coming faster than they think and that human beings will have to learn to adapt and create in order to survive in this fast-changing world.

Concepts and Skills: The game teaches the student to relate in writing an experience-formed description of these concepts; future, change, adapt and cope. It also describes what future civilization will gain and lose by pursuing each of three alternative routes in two of the following categories; communications, language, transportation, production, entertainment, general life quality and innovative technology. The following skills are taught: writing a self-evaluation and group-evaluation of skills at coping with change; using a highly abbreviated simulation language called Future Speech; describing three strategies for coping with change and the stresses each causes.

**Council** INTERACT

**Grade:** 6-12

**Time:** Fifteen class hours

**Players:** The entire class

**Format:** After students take a pre-test on their knowledge of local government, Council begins as students become citizens of the city of Riverstream. Their first task as citizens is to elect a city government. They file petitions for office, make campaign posters, give speeches and elect a mayor and five city council persons. These individuals form the nucleus of the city government. The mayor appoints a city recorder and the chairperson of the Riverstream Planning Commission. Other students receive identities as additional planning commissioners, city and state officials and concerned citizens.

The government and citizens now begin solving local problems. Council contains outlines for 20 problems facing the government.

A typical day has many activities taking place. The city council holds meetings with angry citizens; a planning commission attempts to zone new land; newspaper reporters cover all events; other citizens do research on future topics of the council.

Council concludes when students retake the pre-test and then hold a debriefing period in which they evaluate city government, local problems, proposed solutions and the simulation itself.

**Concepts and Skills:** The game teaches the concept of basic election procedure; responsibilities of local officials, functions of local government; typical local government problems; and the zoning process. The following skills are taught: organizing and delivering a speech to persuade; making decisions as an individual and within a small group and reading maps.

The Dead River EDUCATIONAL GAMES HAWKINS & PLOUTZ

| | |
|---|---|
| Grade: | 7-12, College and Adult |
| Time: | Five playing sessions or one sitting of about 4 hours |
| Players: | 10-32 |
| Format: | This is a role-play, simulation game. |
| Concepts and Skills: | The game uses and develops decision-making skills, knowledge of the social and human ecological problems of water pollution, a feel for cost-benefit considerations and a chance to simulate government-citizen interactions. |

Dig INTERACT

| | |
|---|---|
| Grade: | 5-junior college |
| Time: | Five weeks |
| Players: | The entire class |
| Format: | In Dig, competing teams create secret cultures; artifacts are made that reflect these cultures. Each team buries its artifacts for the other team to excavate and reconstruct. A final confrontation reveals the accuracy of each team's reconstruction and analysis. This is a simulation game. |
| Concepts and Skills: | This game teaches that all people, past and present, have shaped their beliefs and behavior in the face of universal human needs and problems; that the various elements of any culture are interrelated and cannot be understood without examining the culture as a whole; that the culture of any society is constantly being altered; that it is difficult to examine and interpret cultures different from your own; that art reflects the ideas and moods of a culture; and that individual effort and group success are closely interrelated. |

**Dirty Water** DAMON

| | |
|---|---|
| Grade: | 7-12 |
| Time: | 1-2 hours |
| Players: | 2-4 |
| Format: | This is a board game designed to teach basic ecology through role playing and problem solving. |
| Concepts and Skills: | Players become acquainted with the complexities of controlling water pollution in local bodies of water, without indiscriminately restricting industrial activities. Cost of pollution abatement measures and dealing with overpopulation of certain aquatic species are dealt with. |

**Ecology: The Game of Man and Nature** DAMON

| | |
|---|---|
| Grade: | 7-12, College and Adult |
| Time: | 2-6 hours |
| Players: | 2-4 |
| Format: | This game is primarily a board game. Learning takes place from debriefing for the most part rather than in the game itself. |
| Concepts and Skills: | Students try to achieve a balance between man's activities and the natural environment, while advancing through the Four Ages of Development: hunting, agricultural, industrial and environmental. |

**Ecopolis** INTERACT

| | |
|---|---|
| Grade: | 4-6 |
| Time: | Fifteen days |
| Players: | The entire class |

**Format:** Ecopolis begins with a simulation within a simulation. Students are "born" as insects, animals, Indians and pioneers living in an ecosystem existing in America over 150 years ago. While the instructor introduces certain ecological concepts, insects and animals move, die or adapt to the changing environment being reshaped by growing numbers of westward-advancing and technology-carrying American pioneers. Those who survive in the ecosystem receive bonus points at the beginning of the actual simulation. But prior to moving into Ecopolis (a large American city and suburbs built upon the ecosystem which they have just experienced) students complete a survey of what they know about Ecology and the American environment.

**Concepts and Skills:** The game teaches the concept of the ecosystem, how man's attitude toward his physical environment shapes and changes that environment, the degree of pollution in America, its causes and possible solutions, the problem of overpopulation, how serious it is, what does it mean and what should or should not be done about it. The following skills are taught: outlining material; notetaking; using material provided to support general statement; role-playing; and defending a point of view in front of a group.

## The Energy-Environment Game EDISON INSTITUTE

**Grade:** 9-12, Adult

**Time:** 5-7 days (Teachers have reported great success in 7-10 days)

**Players:** 32 or an entire class

**Format:** This is a simulation/role-play game which includes detailed assigned roles and considerable resource materials (filmstrip, record, spiritmasters, wall map, site selection information and related reading matter). It attempts to teach that there are no easy, simplistic, readily available solutions to the problems that face us.

**Concepts and Skills:** The concepts of this this game involve analyzing objectively the ecological, technical, economic and political considerations and trade-offs in planning power plants and other energy-related problems of regional planning.

## Environmental Realities INTERACT

**Grade:** 1-12

**Time:** 1-3 hours depending on amount of discussion between plays

**Players:** 4-6 players or teams of players

**Format:** This is a board game, played with real pictures, cards, a spinner and markers. All players are called upon to participate fully in discussion. A player proceeds to move around the board according to the yes-votes or vetoes of opponents.

**Concepts and Skills:** This game attempts to develop within students an awareness and appreciation of the realities of a modern city. It also exposes students to possible remedies for urban problems. Students are given opportunity to express values and to organize and evaluate ideas as they apply to the city.

## Evolution: The Geologic Time Chart EDUCATIONAL GAMES HAWKINS & PLOUTZ

**Grade:** 5-12, Adult

**Time:** 40 minutes - 1 hour

**Players:** 2-6

**Format:** This game is played with a board, chips, markers and dice. The object of the game is for students to win by evolving into higher animal forms (preferably monkey or man) and by increasing his population.

**Concepts and Skills:** This game deals with animal life on earth. Players assume the role of animals and compete for existence, dominance and evolution into higher forms. Students learn the names of eras and periods in proper order along with animals that lived at each point in time. Evolution follows the most widely accepted time theories and is accurate to time and animals introduced within each period and era.

### Executive Decision

3-M BOOKSHELF GAME

Grade: 6-12, Adult

Time: 2-4 class periods (12 rounds)

Players: 2-6

Format: This is a board game in which students as top-level executives of a large corporation make monthly decisions regarding the purchase of raw materials and the manufacturing and selling of finished goods. Since prices fluctuate according to supply and demand, each decision the player makes affects the overall profits or losses of his corporation. Player who succeeds in making the most profit for his corporation is the winner.

Concepts and Skills: Students learn about the rule of supply and demand; decision making regarding the purchase of raw materials; the manufacturing and selling of finished goods.

### Litterbug

DAMON

Grade: K-5

Time: Less than 1 hour

Players: 2-4

Format: This is a board game in which a student wins by the volume of trash he has collected from the board and therefore because he has done the best job of cleaning streets and sidewalks.

Concepts and Skills: Students proceed around the board collecting litter which they deposit in their trash containers. The object of the game is to keep the community clean and free of litter by depositing trash in proper receptacles.

**The Lobbying Game** INTERACT

| | |
|---|---|
| Grade: | 7-12 |
| Time: | 3 hours |
| Players: | 34 |
| Format: | This role-playing simulation is played in a large room with as many chairs as players, arranged to simulate a legislative chamber. Students are assigned roles, given materials and instructed to promote the submission of bills. Discussion and lobbying follow. |
| Concepts and Skills: | The Lobbying Game teaches intricacies of the legislative process. |

**Making Your Own World** COCA-COLA COMPANY

| | |
|---|---|
| Grade: | 4-8 |
| Time: | Variable, three hours or as long as the teacher wishes |
| Players: | An entire class |
| Format: | This is a very flexible game designed to produce role-playing. With proper leadership all players participate. |
| Concepts and Skills: | The game involves city-planning, critical thinking, problem solving, ecology, social interaction and role playing. This is a very visual game that involves everyone and can be extremely valuable for instruction. |

**New Town** HARWELL ASSOCIATES

| | |
|---|---|
| Grade: | 6-14 |
| Time: | Variable for different grades |
| Players: | 2-4 per board |
| Concepts and Skills: | Decision-making, problem solving, planning and environmental improvement |
| Format: | This board game builds a number of situations which teach about community construction, government, planning, or cooperation for better government. |

**N-Trow-P** ENVIRONMENTAL EDUCATION OFFICE

Grades: 6-9

Time: 20-40 minutes

Players: 3-6

Format: Board game with bean bag toss board

Concepts and Skills: The game teaches about entropy through a play strategy designed around energy flow through a community.

**Planning the Human Community (Ecology Learning Module)** SVE

Grade: 5-8

Time: Variable - This module may be employed as a complete unit or portions of it may be used in any order as supplementary to social sciences or life sciences.

Players: For small or large group participation

Format: The kit combines the Planning Game, the simulation game, eight sound filmstrips, and related resource material. The kit is a total learning experience. The filmstrips provide conceptual readiness for the simulation. The board game provides skills readiness.

Concepts and Skills: The primary concept taught is that any human community both affects and is affected by the natural environment around it. It also teaches students that trade-offs are required in order to preserve a high quality of life and to preserve the environment.

### The Pollution Game DAMON

Grade: 7-12, Adult

Time: One to two periods

Players: 4-8

Format: This is a board game requiring students to make decisions which may or may not help to clean up the environment. They are forced to deal with rising air and water pollution which results as a byproduct of their moves throughout the game.

Concepts and Skills: The student will develop problem-solving, critical thinking, and appreciation for dealing with pollution problems.

### Population: A Game of Man and Society DAMON

Grade: 6-12, College and Adult

Time: 2-3 hours

Players: 2-6

Format: This is a board game dealing with population.

Concepts and Skills: This game points out the balance, usually lacking, between population growth and resources that is so necessary for a country to avoid problems. The idea of a population explosion is graphically portrayed.

### The Propaganda Game WIFF & PROOF

Grade: 9-12 (Teacher may wish to "water down" for use with eighth grade students)

Time: 1 hour or more (considerable additional time to be allotted for absorbing directions)

Players: 2-4

Format: This game is primarily played with idea cards and a clear thinking chart. Cards are drawn and students identify flaws and techniques of logic.

Concepts and Skills: In this game, students are led to become aware of the emotional overtones in all arguments and suggestions. They attempt to identify propaganda techniques while gaining control over their responses to the ideas they encounter daily.

Queries 'n' Theories WIFF & PROOF

Grade: 9-12, Adult

Time: 1 hour or more (considerable additional time will be required for interpretation of directions)

Players: 2-4

Format: This game sequence is played with individual game charts, colored plastic chips and an egg timer. The rules are designed so that the play is a simulation of the scientific method.

Concepts and Skills: Students are introduced to some basic ideas of modern linguistics and the scientific method of inquiry. Theories are built and tested. Queries 'n' Theories is a series of games which move from the simple to the complex which can be played as a pure game or for "what it all means" in relationship to science and linguistics. It has the advantage of adaptation to students of unequal abilities.

Smog DAMON

Grade: K-5

Time: 1 hour or less

Players: 2-6

Format: Hopscotch-type game where students hop around "town" replacing trash cards with beauty cards.

Concepts and Skills: The game deals principally with trying to get students to have positive attitudes toward substituting trash problems with beauty solutions of different varieties.

| **Smog** | DAMON |
|---|---|
| Grade: | 7-12 |
| Time: | 1-2½ hours |
| Players: | 2-4 |
| Format: | This is a board game dealing with air pollution and city management. |
| Concepts and Skills: | The students develop the skills involved in city management, decision making, problem solving, environmental management and critical thinking. |

| **Stocks and Bonds** | 3-M BOOKSHELF GAME |
|---|---|
| Grade: | 7-12, Adult |
| Time: | 2-3 class periods (ten game years) |
| Players: | 2-8 |
| Format: | This game transports students to Wall Street. They shrewdly invest in the game's ten securities, buying and selling each year (each round) in an attempt to become the wealthiest stockholder in the game. The game has a unique calculator which tells students if they have had a Happy Monday or a Black Friday.<br>Stocks and Bonds is for two to eight players. The bookshelf case contains a stock board, marker, dice, calculator, record sheets, situation cards, stock certificates and instructions. |
| Concepts and Skills: | Students become familiar with the many jobs of Wall Street. They become familiar with securities, buying and selling, and how to become rich or poor from the Stock Market. Students also learn the many terms used when dealing with Wall Street. |

## Stock Market Game AVALON HILL

Grade: 6-12, Adult

Time: 2-3 class periods

Players: 2-4 (It may be expanded to include an entire class.)

Format: The Broker gives each player, including himself, $2000 in cash, ten shares of Blue Chip stock, ten shares of Speculative stock and five Trading Post discs of the same color. All remaining cash and certificates are kept in the "bank". The Broker goes through a series of moves and trend cards are shuffled and placed face down on the playing board. The winner is the player who has the greatest net worth at the end of Turn 12.

Concepts and Skills: The skills and concepts are somewhat similar to the ones learned in Stocks and Bonds. Basically, students become familiar with market terms; ways of making or losing money; the jobs of the Broker, etc.; and other skills when dealing in the stockmarket.

# GAME MANUFACTURERS

Interact
P. O. Box 262
Lakeside, California 92040

Damon Educational Division
80 Wilson Way
Westwood, Massachusetts 02090

Wiff'n & Proof
1111 OM Maple
Turtle Creek, Pennsylvania 15145

Cardinal Printers, Inc.
Wesleyan Station
Middletown, Connecticut 06457

Union Printing Company, Inc.
17 West Washington Street
Athens, Ohio 45701

Society for Visual Education (SVE)
1345 Diversey Parkway
Chicago, Illinois 60614

Harwell Associates
Box 95
Convent Station, New Jersey 07961

# APPENDIX

## 3-5 UNIT SYNOPSES

Economics 3: At the completion of this unit the student will be able to demonstrate the importance of value and variety of resources.

- Option 1 - Students make money by selling junk art.
- Option 2 - Collection of newspapers is used to identify the value of a resource.
- Option 3 - The film, "America's Endangered Species", is used to demonstrate the value of wildlife.

Economics 4: At the completion of this unit the student will be able to list examples of the trading of a man's time and skills at his job to the wages or income he receives.

- Option 1 - A visit to a factory is used to show conditions under which men work.
- Option 2 - The film, "Why Do Fathers Work", is used to show how parents earn income.
- Option 3 - Students make paper logs out of old newspapers to be sold as a product. (This unit can be used after and as a completion to Economics 3, Option 2.)

Economics 5: At the completion of this unit the student will be able to demonstrate how demand affects the cost of a product.

- Option 1 - Rewards are used to show how competition affects cost.
- Option 2 - Tokens are sold to show the effects of demands on cost.
- Option 3 - Economics for Primaries is used to show how the public can affect prices.

Economics 6: At the completion of this unit the student will be able to list tactics used to sell products.

- Option 1 - Students make up advertisements.
- Option 2 - Students watch a television program to analyze commercials.
- Option 3 - Students analyze magazine ads to see how people are persuaded to buy products.

Energy 3: At the completion of this unit the student will be able to define and diagram the link of the sun to food.

- Option 1 - Students grow plants to study how sunlight is turned into energy.
- Option 2 - The film, Green Plants and Sunlight, is used to illustrate how plants produce food.
- Option 3 - Students analyze their diet to determine that the sun is the ultimate source of their own energy.

Energy 4: At the completion of this unit the student will be able to list new ways man uses energy that were brought about by man's need for energy.

- Option 1 - Students make sketches of ancient and modern energy uses to see how needs have changed.
- Option 2 - A fieldtrip to a museum and an energy booklet are used to point out man's changing need for energy.
- Option 3 - Dioramas are used to show how different situations require different uses of energy.

Energy 5: At the completion of this unit the student will be able to list five forms of energy.

- Option 1 - Students observe energy use in nature and in man-made communities to identify the five forms of energy.
- Option 2 - Students visit a bog to discover forms of energy related to fossil fuels.
- Option 3 - Students creatively brainstorm early man's use of energy and compare it with modern man.

Energy 6: At the completion of this unit the student will be able to list the effects on the environment of converting energy to meet man's needs.

- Option 1 - Students hear a lecture on nuclear power plants in order to identify their effect on the environment.
- Option 2 - Ecology posters are used to stimulate a discussion of the causes of environmental problems.
- Option 3 - A candle is burned to illustrate the effect of fossil fuel conversion on the environment.

Population 6: At the completion of this unit the student will be able to define a life cycle and relate it to cyclical nature of populations. The student will also be able to define the relationship of overpopulation to the cycle of population growth.

- Option 1 - Students observe the growth of a mealworm population over an extended period of time and record their observations.
- Option 2 - Students use yeast cells and themselves to see how an environment can become overpopulated.
- Option 3 - Students raise bean plants to learn the results of overpopulation.

Population 7: At the completion of this unit the student will be able to identify the interrelationship of members of a population by means of food webs, food chains, and life cycles. Students will then be able to identify causes for this increase, decrease, or stability of a population.

Option 1 - Students use the multi-media kit, "This Earth", to examine the producer/consumer relationship in nature.
Option 2 - Students set up an aquarium to examine the balance of nature.
Option 3 - Students build bird nests in order to examine the necessity of a particular detailed part of a life cycle.

Population 8: At the completion of this unit the student will be able to identify the inherent systems of checks and balances that help to regulate population growth.

Option 1 - Students examine the pet population to see how man artificially controls population growth.
Option 2 - Students view the film, "World in a Marsh", to see how nature controls population growth in a small community.
Option 3 - Students examine large scale means of natural population control.

Population 9: At the completion of this unit the student will be able to identify the significant ways in which the lifestyles of human populations can affect the environment.

Option 1 - Students examine the role of material goods in human lifestyles.
Option 2 - Students examine the development of human communities around particular community centers.
Option 3 - Students make collages to depict varied lifestyles throughout history.

Technology 4: At the completion of this unit the student will be able to give examples of the good and bad effects produced by technology.

Option 1 - Students use the film, "Turn Off Pollution", to learn about air pollution.
Option 2 - Students view the film, "Automania", to examine the good and bad effects of the auto.
Option 3 - Students study the failure of the Teton Dam to understand good and bad effects of water control.

Technology 5: At the completion of this unit the student will be able identify what effects his life has on the amount and type of industrial growth that takes place.

Option 1 - Students research various occupations to find out occupations are interrelated.
Option 2 - Students identify the kinds of places they would like to live in and not like to live in.
Option 3 - Students distinguish between rubbish from useful and useless items.

Technology 6: At the completion of this unit the student will be able to contrast the increasing rate of technological advancement in the past several years.

Option 1 - Students make inventions to see how one invention leads to many more.
Option 2 - Students examine their use and their parents' past use of electricity to see how technology has lead to an increase of luxuries.
Option 3 - Students study the development of tools briefly from cave man to the industrial revolution to learn what particular inventions cause the greatest amount of change and development.

Technology 7: At the completion of this unit the student will be able to interpret the effects of lifestyles on the consumption of natural resources.

Option 1 - Students study family recreational habits to determine what resources are necessary for them.
Option 2 - Students examine the materials we use in various buildings to determine the use of natural resources.
Option 3 - Students examine the distinction between luxuries and necessities.

Ethics 5: At the completion of this unit the student will be able to list examples of the excessive or wasteful use of natural resources and to identify the possible consequences of these actions.

Option 1 - Students use filmstrips on energy and art materials to present a concept of what our world will be like in 2000 AD.
Option 2 - Students determine how much material is thrown out by the school.
Option 3 - Students view the filmstrip, It's Your World - Welcome To It, which points out how we abuse our environment.

Ethics 6: At the completion of this unit the student will be able to give examples of how different lifestyles make different demands upon the environment.

Option 1 - Students use a chart to analyze what demands we place on the environment.
Option 2 - Students view the film, Africa, Living in Two Worlds, and analyze how people in Africa cope with the environment.
Option 3 - Students examine early American lifestyles and their use of resources.

Ethics 7: At the completion of this unit the student will be able to list things we as individuals can do to care for the earth rather than exploit it.

Option 1 - Students take a nature walk to discover how nature can be preserved.
Option 2 - Mini environments are created in jars to observe the effects of chemicals.
Option 3 - Students work with Johnny Horizon materials in a clean-up campaign.

Ethics 8: At the completion of this unit the student will be able to list important reasons why we should treat the earth in a manner that will permit use to live harmoniously with each other and our environment.

Option 1 - The classroom environment is allowed to become littered to emphasize the need for co-operation in maintaining the the environment.
Option 2 - Students alter four water environments to study the effects of different chemicals.
Option 3 - Students study community environmental problems to find possible solutions.

Decisions 3: At the completion of this unit the student will be able to identify one of the many problems in our environment and its manifestations in order that he may effectively suggest solutions.

Option 1 - Students collect litter in order to get an idea about the need for solutions to the litter problem.
Option 2 - The film, Rivers Must Live, is used to point out the need for solutions to water pollution.
Option 3 - Plants are grown and contaminated with engine exhaust fumes in order to see the results of varied poisons on a plant.

Decisions 4: At the completion of this unit the student will consider not only his personal feelings but the feelings of others as well before making a final decision on a problem.

Option 1 - Students have a bake sale to emphasize community team work.
Option 2 - Students develop their playground area.
Option 3 - Students view Treehouse and compare their decision-making methods.

Decisions 5: At the completion of this unit the student will be able to identify in a given situation the alternatives and the consequences of alternatives before making an environmental decision.

Option 1 - Students plan the development of a total housing community on maps and paper.
Option 2 - Students construct paper bag puppets to present an ecological problem.
Option 3 - People of the Forest module is used to point out group cooperation in known situations.

Decisions 6: At the completion of this unit the student will be able to solve environmental problems and then list consequences that developed and were not thought of previously.

Option 1 - Some plants are exposed to several types of fertilizer, some good and some poisonous, to point out the need for careful examination of consequences.
Option 2 - The "Coca-Cola Game" is used to show students the need for careful consideration of situations.
Option 3 - People of the Forest module is used to show students how a situation can have many unpredictable consequences.

Decisions 7: At the completion of this unit the student will be able to make an environmental decision and be able to list possible future effects.

Option 1 - The Day They Parachuted Cats on Borneo is used to show students the importance of assessing effects.
Option 2 - Students examine a variety of park sites to predict effects of possible changes in the environment around the site.
Option 3 - The People of the Forest module is used to examine a moral dilemma situation developing from a decision made and its consequences.

Ecosystems 5: At the completion of this unit the student will be able to compare the size of the earth in our universe.

Option 1 - Students view the film, "Cosmic Zoom", and discuss the size relationship of man to the universe.
Option 2 - Students participate in an exercise to sizing our solar system.
Option 3 - Students see a filmstrip showing the comparison of man to the universe.

Ecosystems 6: At the completion of this unit the student will be able to explain how plants capture sunlight and use it to help them to make the food and oxygen that people and other animals need in order to live.

Option 1 - The students review their lunch and trace their food back to the Sun.
Option 2 - Students grow beans and compare them to plants grown in darkness.
Option 3 - Students construct and observe the action in an aquarium and on the school grounds.

Ecosystems 7: At the completion of this unit the student will be able to explain that an ecosystem consists of many organisms interacting in a complex relationship between living and non-living parts.

Option 1 - Students explore their school ecosystem to see how the school grounds ecosystems fit together.
Option 2 - Students view a filmstrip/cassette and discuss how things in their world fit together.
Option 3 - The teacher leads the students through an inquiry about the interrelatedness of ecosystem parts.

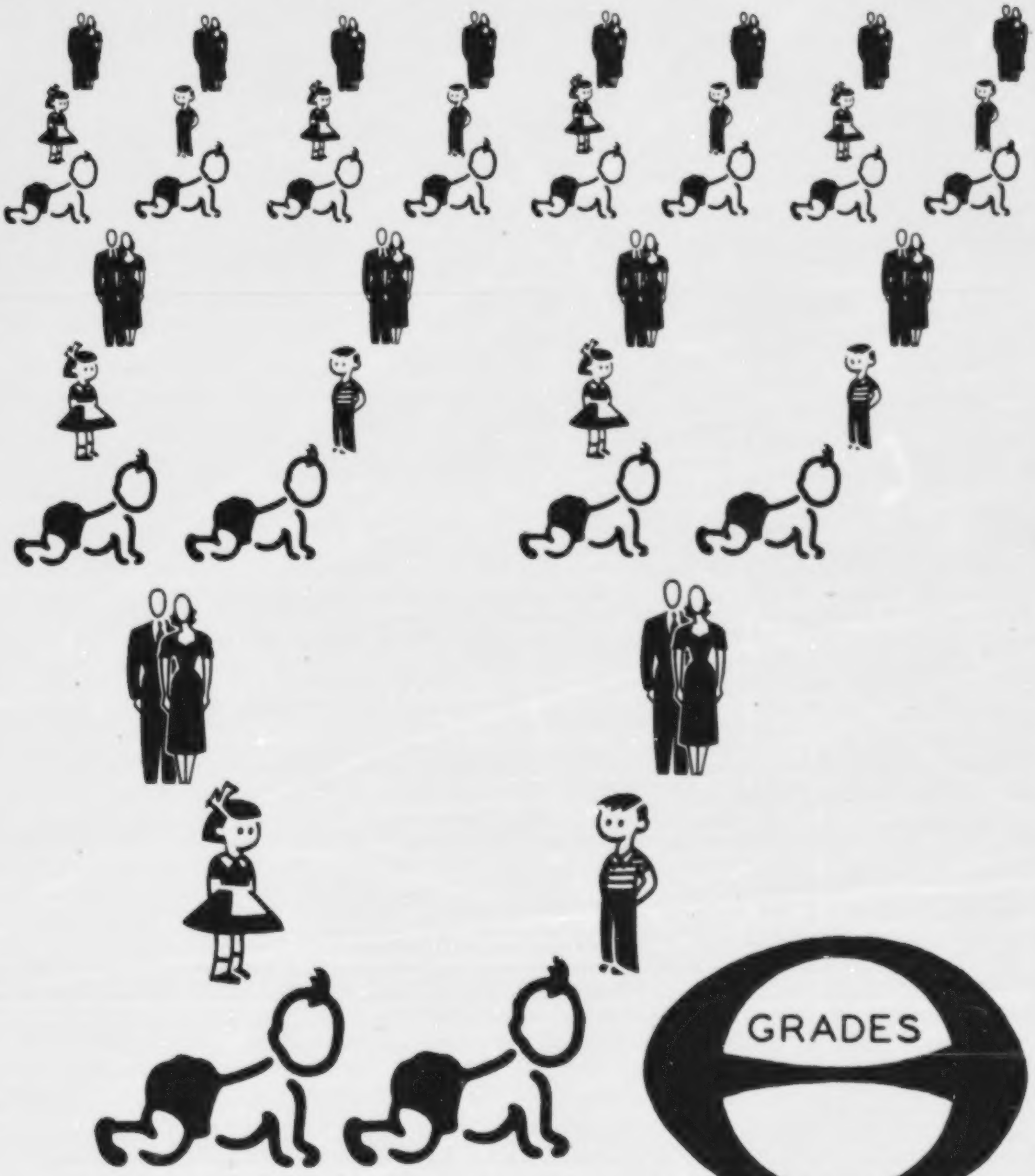
Ecosystems 8: At the completion of this unit the student will be able to explain how the constant change in ecosystems is due to the interaction of the many plants and animals with their non-living environment as evidenced by the many cycles in our ecosystem (carbon, food, or water cycles).

Option 1 - Students play a game which tests their ability to identify parts of ecosystems.
Option 2 - Students study a filmstrip on changes and then apply them in the outdoors.
Option 3 - Students study and compare three micro-ecosystems in a changing situation.

Ecosystems 9: At the completion of this unit the student will be able collect information about the undesirable accumulation of a substance in the environment - pollution - and plan a means of solving the problem.

Option 1 - Students monitor the litter on the school site and attempt to stop it.
Option 2 - Students make a photo essay of community pollution and ask the mayor for solutions and then act on a problem.
Option 3 - Students identify pollution problems and attempt to find resource people to help them solve them.

# POPULATION



GRADES

# ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34
TITLE IVC ESEA

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Synopsis

Population 6: At the completion of this unit the student will be able to define a life cycle and relate it to cyclical nature of populations. The student will also be able to define the relationship of overpopulation to the cycle of population growth.

Option 1 - Students observe the growth of a mealworm population over an extended period of time and record their observations. .. 3
Option 2 - Students use yeast cells and themselves to see how an environment can become overpopulated. .. 6
Option 3 - Students raise bean plants to learn the results of overpopulation. .. 8

Population 7: At the completion of this unit the student will be able to identify the interrelationship of members of a population by means of food webs, food chains, and life cycles. Students will then be able to identify causes for this increase, decrease, or stability of a population.

Option 1 - Students use the multi-media kit, "This Earth", to examine the producer/consumer relationship in nature. .. 11
Option 2 - Students set up an aquarium to examine the balance of nature. 12
Option 3 - Students build bird nests in order to examine the necessity of a particular detailed part of a life cycle. .. 14

Population 8: At the completion of this unit the student will be able to identify the inherent systems of checks and balances that help to regulate population growth.

Option 1 - Students examine the pet population to see how man artificially controls population growth. .. 16
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Option 3 - Students examine large scale means of natural population control. .. 20

Population 9: At the completion of this unit the student will be able to identify the significant ways in which the lifestyles of human populations can affect the environment.

Option 1 - Students examine the role of material goods in human lifestyles. 22
Option 2 - Students examine the development of human communities around particular community centers. .. 28
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## EXPLANATION OF CONCEPT AREA

POPULATION - To study populations we must understand the variety of factors interacting on a global basis to make the area an important part of environmental education.

We begin by making students aware of the variety of populations and the steps they take to satisfy their needs.

In grades 3-5 we develop the idea of systematic interactions to provide checks and balances for population growth. We also explore the role of man and his lifestyle.

These are followed by the development of the concept of origins for life and the role of culture in determining population interactions.

In high school the student focuses on populations and their impacts as modified by culture and resource needs.

## POPULATION 6

### BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to define a life cycle and relate it to cyclical nature of populations. The student will also be able to define the relationship of overpopulation to the cycle of population growth.

### SUBJECT AREAS:

Science, Social Studies

2

OPTION #1 - twenty minutes one or two days a week for a semester or more

## MATERIALS AND RESOURCES

550 mealworms @ 1¢ each, available at aquarium shops
bran or oatmeal, about three pounds
three (3) one quart containers per class
sponge squares
raw carrots or potatoes

## PROCEDURE:

1. Obtain mealworms from a local pet shop and place different numbers of worms in each container, figure 1.
2. Record the starting point for each population on your graph, figure 2.
3. At least once a week count each population and record the number of larvae, pupae, and adults. The life cycle takes from four to six months at 30° C.

   CAUTION: Adult beetles can fly so be careful when counting them.
4. Remind the students to keep the sponge damp at all times. It is the only source of moisture.
5. Place a small carrot or potato chunks on top of the paper only when you have adult beetles present.
6. Record the three stages on the same graph so that the changing composition of organisms can be followed, one graph per container.
7. Note the graphs will overlap each month. This makes it easier to tape the graphs together for tracing the full cycle.

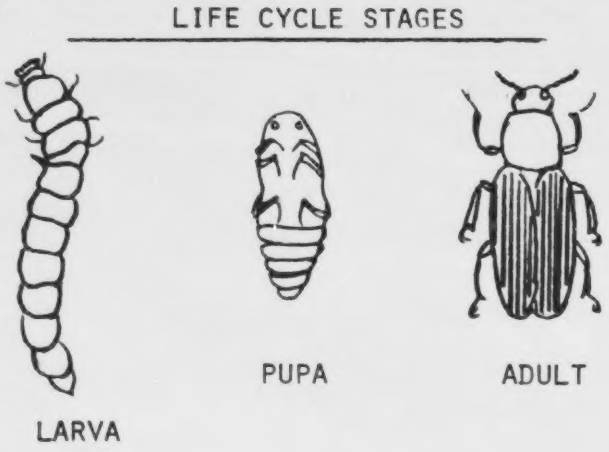
## DISCUSSION QUESTIONS (to be used when events call for them)

1. What is taking place in each container based upon what the graphs show?
2. Can we make predictions for the following month? Why?
3. What are the three stages in this life cycle?
4. How long is the life cycle? How can we tell?
5. How long will our populations continue to grow? How will the population be limited?
6. Does this happen to humans? How about other animals?
7. What factors control human population size?

3

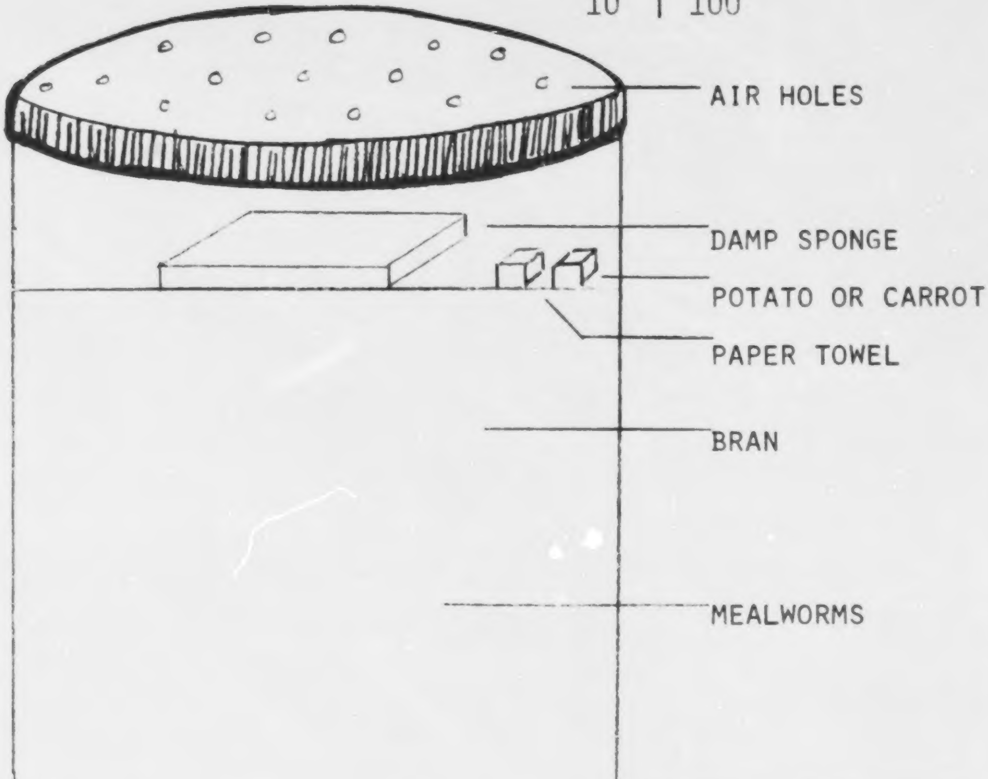
OPTION #1

FIGURE 1


LIFE CYCLE STAGES
LARVA
PUPA
ADULT

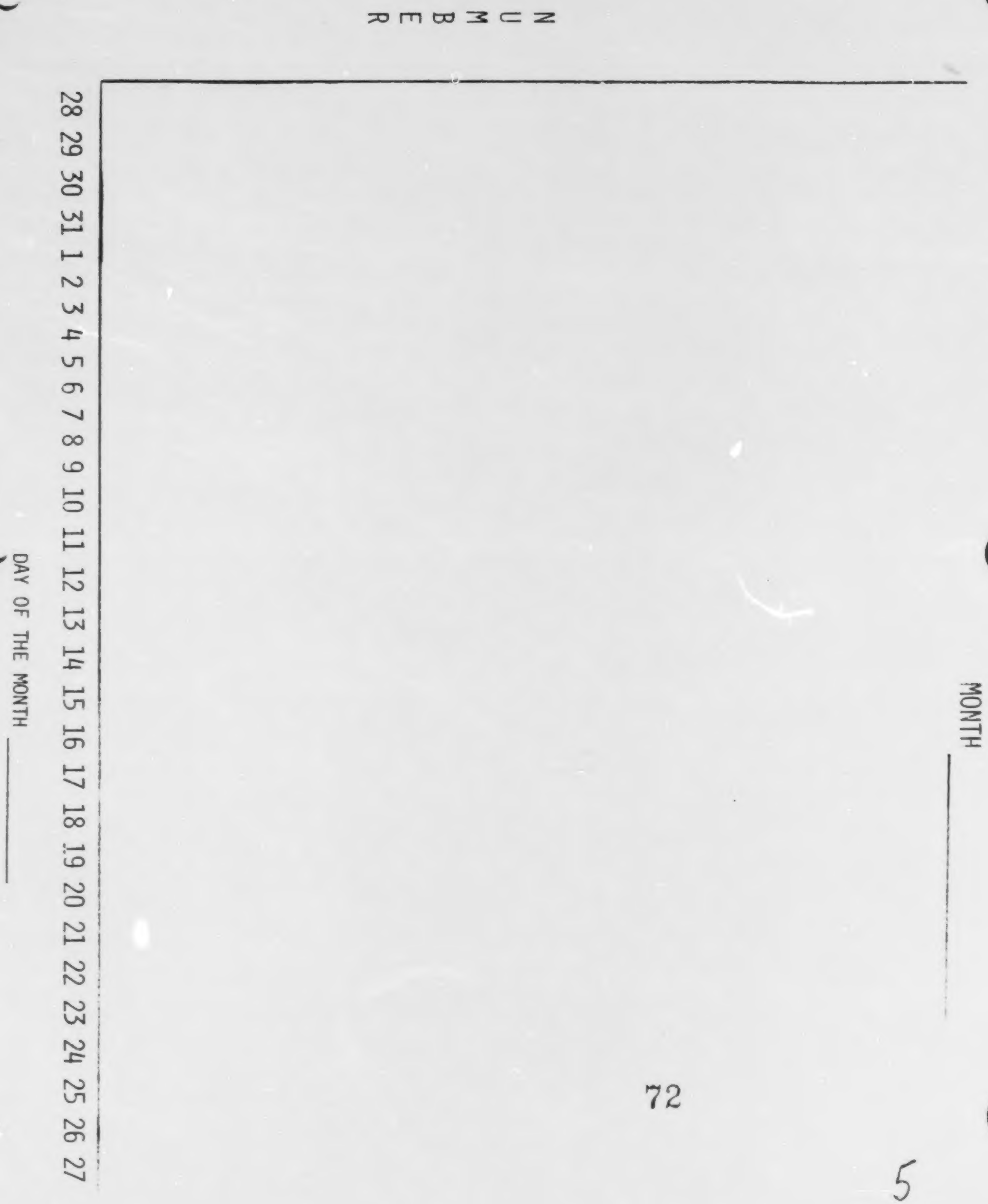
WORM DISTRIBUTION

| CONTAINER # | NUMBER |
|---|---|
| 1 | 10 |
| 2 | 20 |
| 3 | 30 |
| 4 | 40 |
| 5 | 50 |
| 6 | 60 |
| 7 | 70 |
| 8 | 80 |
| 9 | 90 |
| 10 | 100 |


AIR HOLES
DAMP SPONGE
POTATO OR CARROT
PAPER TOWEL
BRAN
MEALWORMS

OPTION #1

FIGURE 2



5

## OPTION #2

### MATERIALS AND RESOURCES

1 quart bottle filled halfway with water
1 package of dry yeast
30 ounces of molasses
20 beans or peas
microprojector
slides
cotton
medicinal iodine

### PROCEDURE:

1. Prepare the mixture by putting water, molasses, seeds, and yeast in a bottle and insert a cotton plug. Mark the container.
2. Set in a warm place, about 80-85 degrees F, perhaps on a radiator.
3. Mark the jar daily to show the growth.
4. Stir each day.
5. Take out a drop from the middle of the bottle and place it on a slide adding a drop of iodine.
6. Place the slide on the microprojector and have the students observe and record the number of cells present. Also record the changes that occur in the bottle.
7. Continue the observing and recording procedure each day for ten days.
8. Use sample graphs to record the changes.

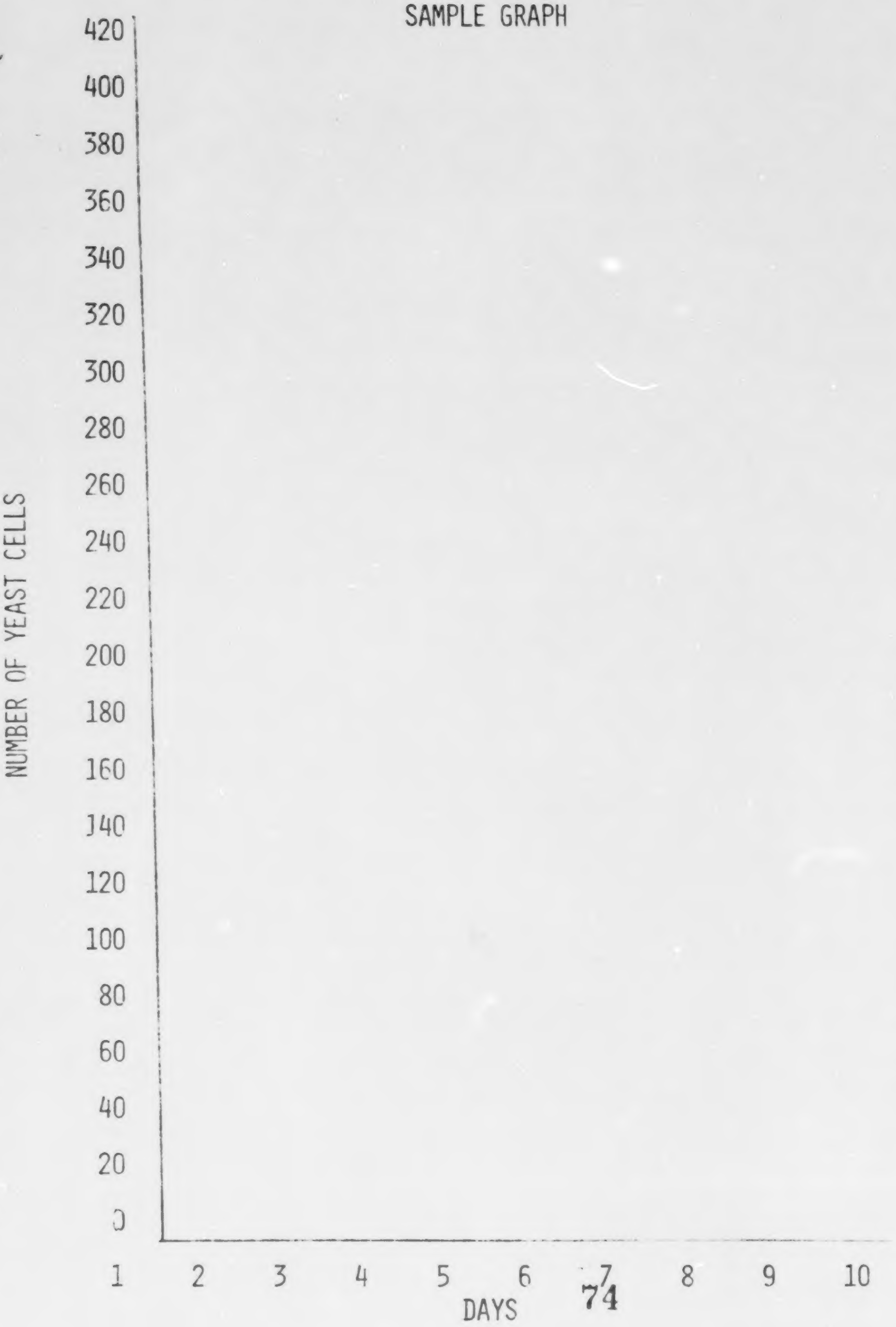
### DISCUSSION QUESTIONS

1. What changes did you see?
2. On which day did we count the most cells?
3. Which day did we count the fewest cells?
4. Why do you think the cells died?
5. How could we have kept them growing?
6. What will happen to people if we cannot produce enough food?

6

OPTION #2

## SAMPLE GRAPH



OPTION #3 - early spring

## MATERIALS AND RESOURCES

50 bean seeds
14 pots
Assorted nutrients
Weed free soil
String
Chart and marking pens
Ruler
"The Monarch Butterfly", 28D Film Coop

## PROCEDURE:

1. Plant six pots with two seeds each and six pots with six seeds each.
2. Label pots with two seeds, Group A, and the pots with six seed, Group B. Number the pots in each group also.
3. Show the film listed above and discuss the lifecycle of animals and finally man.
4. Add different nutrients according to the chart below:

| | | | | | | |
|---|---|---|---|---|---|---|
| A | 1<br>CONTROL | 2<br>NITROGEN | 3<br>POTASSIUM | 4<br>PHOSPHORUS | 5<br>NITROGEN<br>POTASSIUM<br>PHOSPHORUS | 6<br>IRON |
| B | 1<br>CONTROL | 2<br>NITROGEN | 3<br>POTASSIUM | 4<br>PHOSPHORUS | 5<br>NITROGEN<br>POTASSIUM<br>PHOSPHORUS | 6<br>IRON |

5. Chart the growth of the beans by setting a ruler in each pot. Each day read the height of the plant.
6. As the plants grow it may be necessary to tie the string from a wall or cabinet so that the plants can climb.

## DISCUSSION QUESTIONS

1. What is a cycle?
2. Is the growth of a seed into a plant that produces more seeds, a cycle that you could depend upon?
3. What are the parts of the bean lifecycle?
4. What are the parts of the bean seed?
5. Does each plant seem to be getting enough food?
6. Which nutrients seem to be the best for the plants?
7. Did any of the plants die? Why do you think they died?
8. What happened to the overpopulated group?

8

OPTION #3 con't

9. What is the population of our town now?
10. Is there enough food for us now?
11. What will our population be in thirty years? Will it be more or less than we have now?
12. Will there be enough food?
13. What can we do to keep the environment favorable to man?

9

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify the interrelationships of members of a population by means of food webs, food chains, and life cycles. Students will then be able to identify cause for the increase, decrease, or stability of a population.

## SUBJECT AREAS:

Mathematics, Social Studies, Science, Art

## OPTION #1

### MATERIALS AND RESOURCES

This Earth: Everything Fits Together, multimedia kit, available $E^2$ Office

### PROCEDURE:

### PART I

1. Show two sound filmstrips.

2. Distribute inquiry sheet "Producers, Consumers, and Decomposers" from the kit to each student.

3. Show the silent filmstrip and have the students fill out the inquiry sheets. The filmstrip has two parts to it. The first part is "P, C, and D" and the second part is "Assessment" which is to be used later.)

### PART II

1. Read the instructions in the guide, pages 26-36.

2. Duplicate and distribute Small-Group Activities Sheets for each student, "Partners for Life", "Services in Nature", "Food Chains", "Making Food Webs", "Energy Game", and "What Our Class Needs".

3. Divide the class into groups of four to six students.

4. Have the groups proceed through the activities in the above order.

5. Work with the individual groups after the activities have begun. Students may be able to work at their own pace.

6. When all activities have been completed and turned in, distribute the copies of the "Assessment Sheet".

7. Show the second half of the silent filmstrip and have the students fill out "Assessment".

8. Collect this sheet and evaluate.

## OPTION #2 - Springtime or early fall

### MATERIALS AND RESOURCES

How to Make an Aquarium, Life in a Pond, Life in an Aquarium, filmstrips, Denoyer-Geppert, Inquiry Audio-Visuals

20 gallon aquarium
Algae
2" goldfish
Snails
Pump
Plastic hose
Charcoal
Surface plants
Underwater plants
Gravel
6" bluegill
Underground filter
3-way connector
Above ground filter
glass wool

PROCEDURE: This project can be carried on all year or last for a two week period.

1. Set up the aquarium.
    a. Make certain the aquarium is completely clean.
    b. Wash the gravel several times.
    c. Set up below gravel filter complete with air tubes.
    d. Place gravel on the filter.
    e. Put a sheet of plastic or waxed paper on top of the gravel to deflect the water as you fill the tank. When the tank has water one inch from the top, stop incoming water and remove the plastic or waxed paper.
    f. Fill the above ground filter with one half charcoal on the bottom and the glass wool on the top. Attach the air hoses.
    g. Attach hoses to air pump.
    h. Set the aquarium up about four days prior to adding plants and animals.
2. Do not add food.
3. This food chain should last for several weeks without adding any more food.
4. Allow students classtime daily to observe the food chain and to count the members of the food chain each day using the chart included.
5. Draw a food chain.

### DISCUSSION QUESTIONS

1. Who ate what or who?
2. What happened when the bluegill became very hungry?
3. Can a food chain be drawn on the data gathered?
4. What living things are on the bottom of the food chain?
5. What living things are at the top of the food chain?
6. What will happen to the bluegill unless he gets more food put into the aquarium?

12

13

| DATE | Stalks of algae | Mosquitoes | Goldfish | Bluegill | Snails | Other Observations |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

OPTION #2

## OPTION #3 - two to three class periods in the spring or fall

### MATERIALS AND RESOURCES

A real bird's nest, available $E^2$ Office
A work and display area
Filmstrip, "Looking at Birds", Film Coop #22

### PROCEDURE:

1. Show the filmstrip.
2. Ask the children to collect any items they feel could be woven into a bird's nest.
3. Caution them to avoid poison ivy or poison oak. Ask them not to pick any wildflowers. Weather permitting, this project can be done on the school grounds.
4. Ask the students to construct a nest from the materials they have collected. By weaving these materials together, most children learn to appreciate birds far more. The real challenge will come in affixing the "homemade" nests to broken branches for display. Long pieces of thicker grasses can be used to actually tie the nests to branches.
5. When these nests are completed compare them to a real bird's nest to note shape, depth, and woven texture. Also point out the materials used to construct the bird's next.

### DISCUSSION QUESTIONS

1. Is nest building essential in a bird's life cycle? How so?
2. What materials do birds use to make nests?
3. What materials did you collect?
4. Were the materials easy to find?
5. Where did you find them?
6. How do birds attach their nests to branches?
7. In an area with few materials, would you or the bird have trouble gathering a nest?
8. If you were a bird, would you stay in an area with few materials?
9. Would a population of birds decrease or increase in size as the area becomes more urban and industrialized?
10. Are birds interacting with their environment when they build nests?

14

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify the system of checks and balances that helps to regulate population growth.

## SUBJECT AREAS:

Science, Social Studies, Art

## OPTION #1

### MATERIALS AND RESOURCES

Tally sheet
Resource person from the Humane Society or a local animal shelter

### PROCEDURE:

1. Take a survey in the class to learn how many families have dogs, cats, or other pets and how many of each. Record these results on a tally sheet.
2. How many of the pets were bought and how many were found?
3. How many of these pets have been spayed or neutered?
4. Have the students take a survey of the number of dead cats and dogs seen on the roads. Survey for a week and total these numbers.
5. Have a speaker from the Humane Society or from a local animal shelter discuss the problem of pet overpopulation with your class.
6. Discuss how the dog and cat populations control themselves.

### DISCUSSION QUESTIONS

1. Why are there too many pets?
2. What reasons can you think of for taking care of these pets so that they cannot have young?
3. How can we regulate the number of pups and kittens that may be born?
4. What happens when there are too many pets?
5. Is there a natural check for the pet population?
6. What impact does overpopulation of pets have on human food supply?

OPTION #1

## PET POPULATION TALLY SHEET

| | |
|---|---|
| DOGS | |
| CATS | |
| MICE | |
| HAMPSTERS | |
| GUINEA PIGS | |
| GERBILS | |
| BIRDS | |
| TURTLES | |
| FISH | |
| RABBITS | |
| OTHER | |

OPTION #2

MATERIALS AND RESOURCES

World in a Marsh, film
Communities in Nature, murals and food webs } available $E^2$ Office

PROCEDURE:

1. Show the film.
2. Distribute the food web chart.
3. Illustrate the food web concept with the murals and food webs in the kit.
4. Have the students take information from the chart, research the relationship of the various animals and plants, and make an extensive food web.

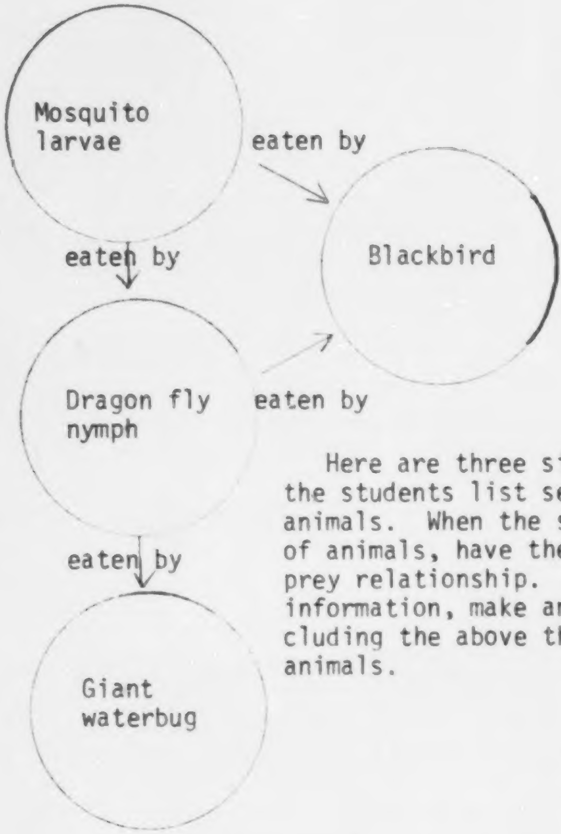
DISCUSSION QUESTIONS

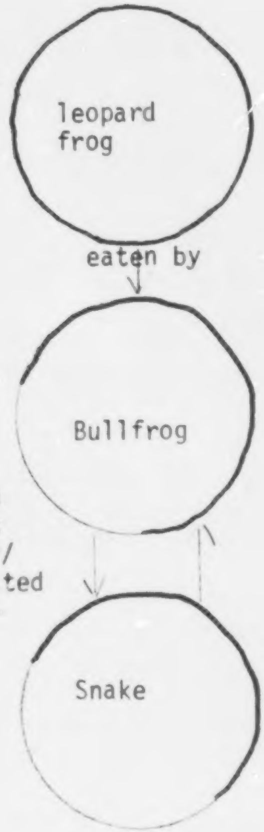
1. What do the plants provide for the community?
2. Why is this important?
3. Why do some animals (frogs) have to produce thousands more eggs than other animals (birds)?

18

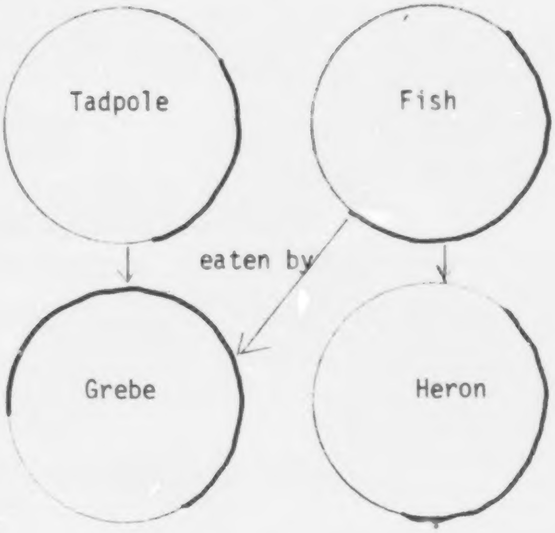
## OPTION #2

## FOOD WEB


Mosquito larvae
eaten by
Blackbird
eaten by
Dragon fly nymph
eaten by
eaten by
Giant waterbug


leopard frog
eaten by
Bullfrog
Snake

Here are three simple food webs. Have the students list several other basic marsh animals. When the students have their list of animals, have them research the predator/prey relationship. By using all the collected information, make an extensive food web including the above three and the list of animals.


Tadpole
Fish
eaten by
Grebe
Heron

## OPTION #3

### MATERIALS AND RESOURCES

How Nature Protects Animals, #25 N. Lake County Film Coop
The Red Fox: A Predator - #26 N. Lake County Film Coop

### PROCEDURE:

1. Show these two films to your class.
2. Explain that an adequate food supply is necessary for all the population to survive.
3. Discuss facts that the existence of disease, unfavorable weather conditions and natural disasters all help in checking and balancing populations.

### DISCUSSION QUESTIONS

1. How does one animal check another animal?
2. How does nature help to protect its animals?
3. When is an area considered overpopulated?
4. What areas are overpopulated?
5. Is our country more or less populated than other parts of the world?

### FURTHER ACTIVITIES

1. Have the students illustrate aspects of nature's system of checks and balances.
2. Have the students conduct a survey of all the pets living in the town or a subdivision.
3. Have the students find out how much pet food is sold yearly.
4. Have the students write a story about a predator/prey relationship.

20

## POPULATION 9

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify the significant way in which the lifestyle of a human population can affect the environment.

SUBJECT AREAS:

Social Studies, Art, Science

OPTION #1

## MATERIALS AND RESOURCES

Bulletin board
Large picture of an automobile
Traffic Count Ditto
Diagram 1
Chart 1

## PROCEDURE:

1. Explain to the students you want to determine how much their families and the people in the community depend upon autos.
2. Select spots in the community that are main traffic arteries and assign teams of three students to each of these spots. They are to count all of the vehicles that pass the spot in a half hour interval. They should also count all of the people in each vehicle.
3. Assign the remainder of the students to count the number of vehicles and people per vehicle that use the school road in the morning and evening.
4. Complete the chart for the entire school grounds and each of the community sites. Discuss the data. See questions.
5. Make a bulletin board using the auto as a central focus. Ask the students to bring in pictures of any product or resource connected to the auto. (See diagram: Aspects of the auto)
6. Discuss the good and bad aspects of the auto and what it has done for our way of life.
7. Survey some older people who can remember when everyone did not have their own car. (See list of questions, Lifestyle Survey)

## DISCUSSION QUESTIONS

1. What do your car counts tell you about transportation in our community?

   People/car     Vehicle type     Congestion     Road use

2. Is transportation a problem in our town?
3. What can be done to reduce car use in town?
4. Do you know what a carpool is? Have you ever been in one?
5. What do you think is the best way to get people back and forth from school?
6. Is one place worse than others in the community? Why?
7. How does the bulletin board change your idea of the auto?
8. Do you see anything wrong with one invention having such influence on our lives?

22

OPTION #1 con't

ADDITIONAL QUESTIONS

9. What can we do to reduce the use of the auto?
10. How could we solve the traffic problems around our school?
11. What part can you play in changing the impact of the car on the environment?
12. Design a plan for our school and completely omit cars and busses, i.e. no parking lots or driveways.

23

OPTION #1 con't

## SUMMARY DISCUSSION QUESTIONS (FOR USE WITH ALL OPTIONS)

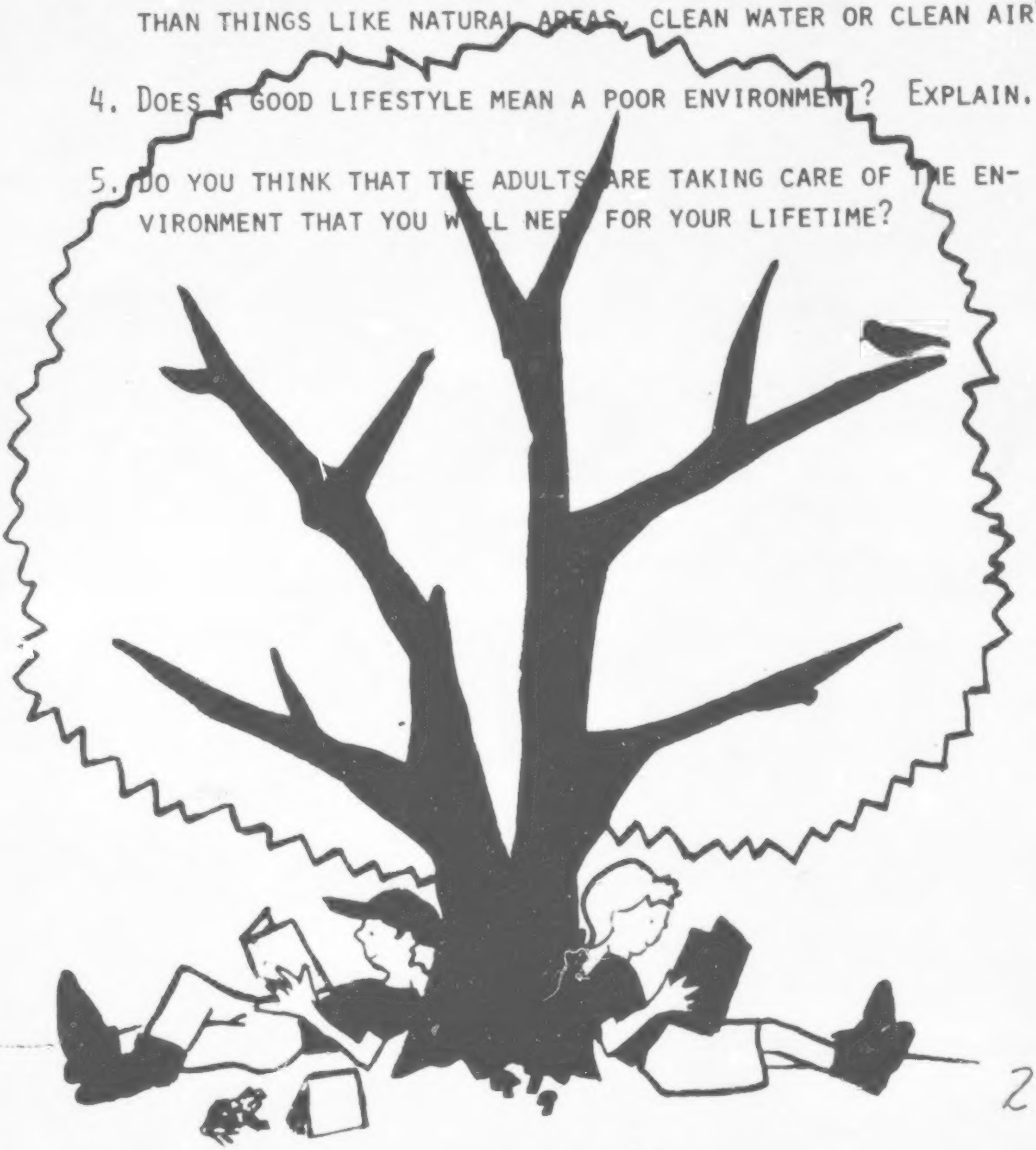
1. IF THE POSSESSIONS THAT WE HAVE HELP TO MAKE UP OUR LIFESTYLE, HOW CAN WE HAVE A GOOD LIFESTYLE AND REDUCE OUR IMPACT ON THE ENVIRONMENT?

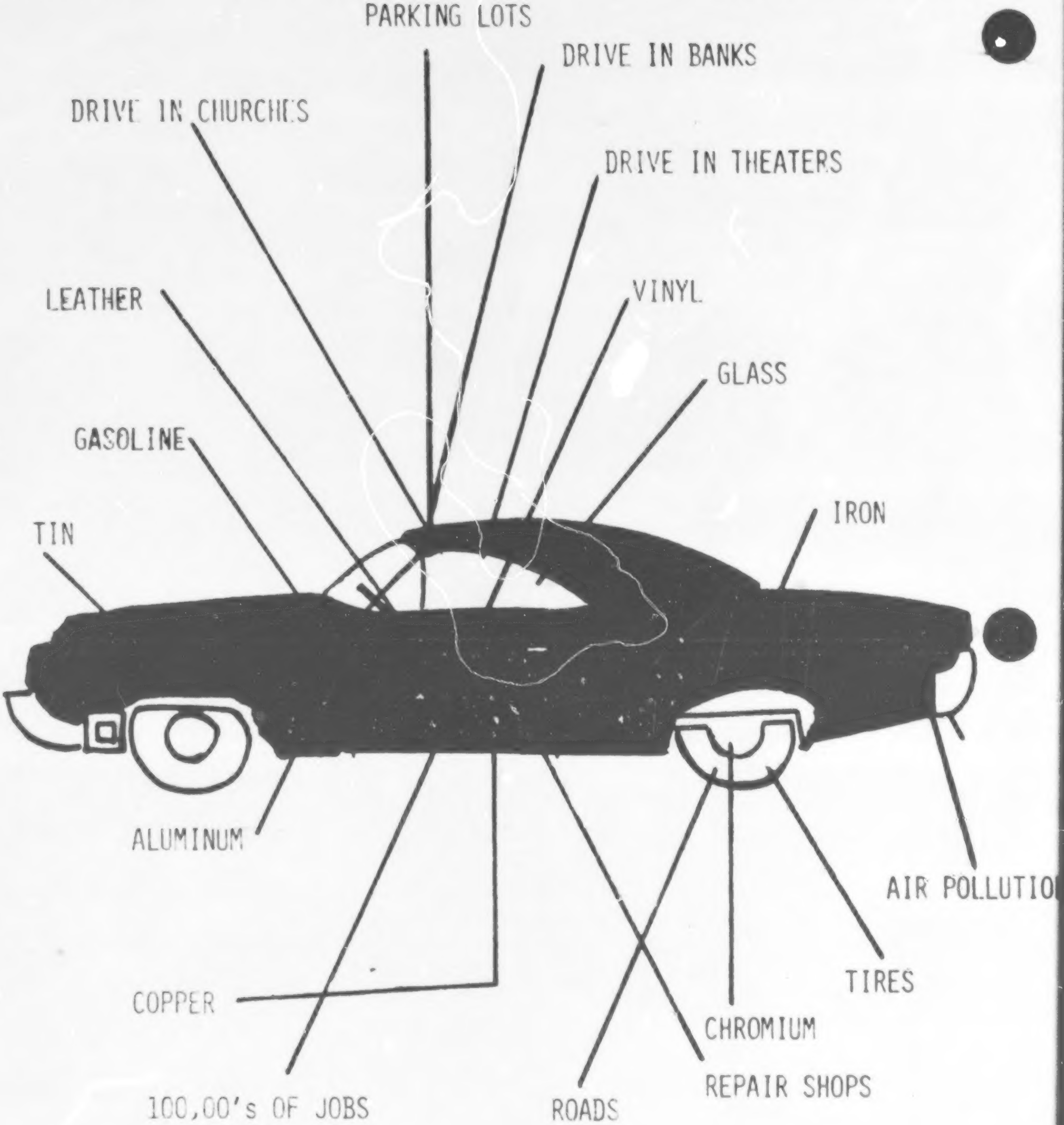
2. DO YOU KNOW OF ANY WAYS THAT YOU HELP TO DAMAGE THE ENVIRONMENT?

3. DO YOU THINK THAT PERSONAL POSSESSIONS ARE WORTH MORE THAN THINGS LIKE NATURAL AREAS, CLEAN WATER OR CLEAN AIR?

4. DOES A GOOD LIFESTYLE MEAN A POOR ENVIRONMENT? EXPLAIN.

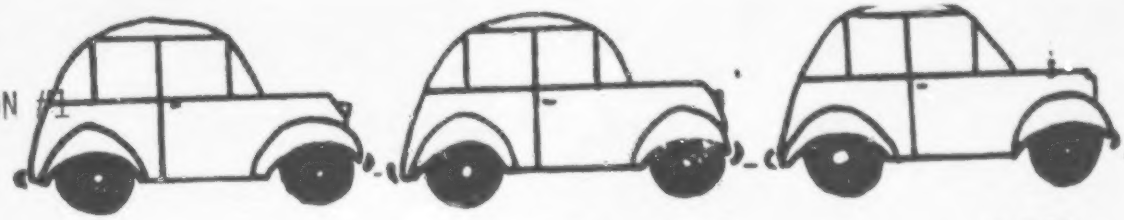
5. DO YOU THINK THAT THE ADULTS ARE TAKING CARE OF THE ENVIRONMENT THAT YOU WILL NEED FOR YOUR LIFETIME?




PARKING LOTS
DRIVE IN BANKS
DRIVE IN CHURCHES
DRIVE IN THEATERS
LEATHER
VINYL
GLASS
GASOLINE
TIN
IRON
ALUMINUM
AIR POLLUTIO
TIRES
COPPER
CHROMIUM
100,00's OF JOBS
ROADS
REPAIR SHOPS

25

OPTION #1



COMMUNITY TRAFFIC COUNT DITTO

SITE #_____ LOCATION___________

| TYPE | NUMBER | PEOPLE/VEHICLE | TOTAL |
|---|---|---|---|
| AUTO | | | |
| TRUCKS | | | |
| BUSSES | | | |
| OTHER | | | |

TOTAL ___________ TOTAL ___________

AVERAGE PEOPLE PER VEHICLE ___________

OPTION #1 LIFESTYLE SURVEY DITTO

1. HOW FAR BACK CAN YOU REMEMBER WHAT YOUR LIFESTYLE WAS LIKE?

2. HOW DID YOU GET AROUND THEN?

3. DID PEOPLE TRAVEL LONG DISTANCES ON VACATIONS, TO AND FROM WORK, TO VISIT, TO SHOP, TO CHURCH?

4. WHAT WERE THE ROADS LIKE?

5. DID YOU HAVE ACCESS TO AIR TRAVEL?

6. ARE THE FORMS OF TRANSPORTATION YOU USED STILL AROUND? IF NOT, WHAT HAPPENED TO THEM?

7. WHAT DO YOU SEE HAPPENING OR BEING BUILT MAINLY BECAUSE OF THE AUTO?

## OPTION #2

### MATERIALS AND RESOURCES

Individual data table
Sport facilities data table

### PROCEDURE:

1. Have the class survey their community for recreational facilities.
2. Each student should be given a family members sheet and a sports data sheet.
3. The unit can be correlated with a map study skill by mapping the school vicinity and locating pertinent landmarks, such as location of the school, their own home, ballfields, ice rinks, tennis courts, etc.
4. Make a large chart with the data collected. Display.

### DISCUSSION QUESTIONS

1. What sports can be played at the school?
2. Who participates in the use of recreational facilities found at school and in town?
3. Where are these facilities found?
4. If you could add more of these facilities, where would you put them? Why?
5. How did the community acquire this land in the first place?
6. What changes would be necessary to serve the recreational needs of everyone?
7. How much of the land is devoted to business and commercial needs?

OPTION #2 DATA SHEET #1

## SPORTS DATA

| FACILITY | HOW MANY | LOCATION(S) |
|---|---|---|
| PARKS | | |
| BASEBALL FIELDS | | |
| ICE SKATING RINKS | | |
| TENNIS COURTS | | |
| SWIMMING POOLS | | |
| FOOTBALL FIELDS | | |
| HORSESHOE THROWING | | |
| SHUFFLEBOARD COURTS | | |

OPTION #2 DATA SHEET #2

## FAMILY MEMBERS

| Family Member | Baseball | Ice Skating | Tennis | Football | Other | No sport |
|---|---|---|---|---|---|---|
| #1 | | | | | | |
| #2 | | | | | | |
| #3 | | | | | | |
| #4 | | | | | | |
| #5 | | | | | | |
| #6 | | | | | | |
| #7 | | | | | | |
| #8 | | | | | | |

Students are to survey their own family's sports interests. Check each sport in which the member actually participates.

30

SUMMARY DISCUSSION QUESTIONS (FOR USE WITH ALL OPTIONS)

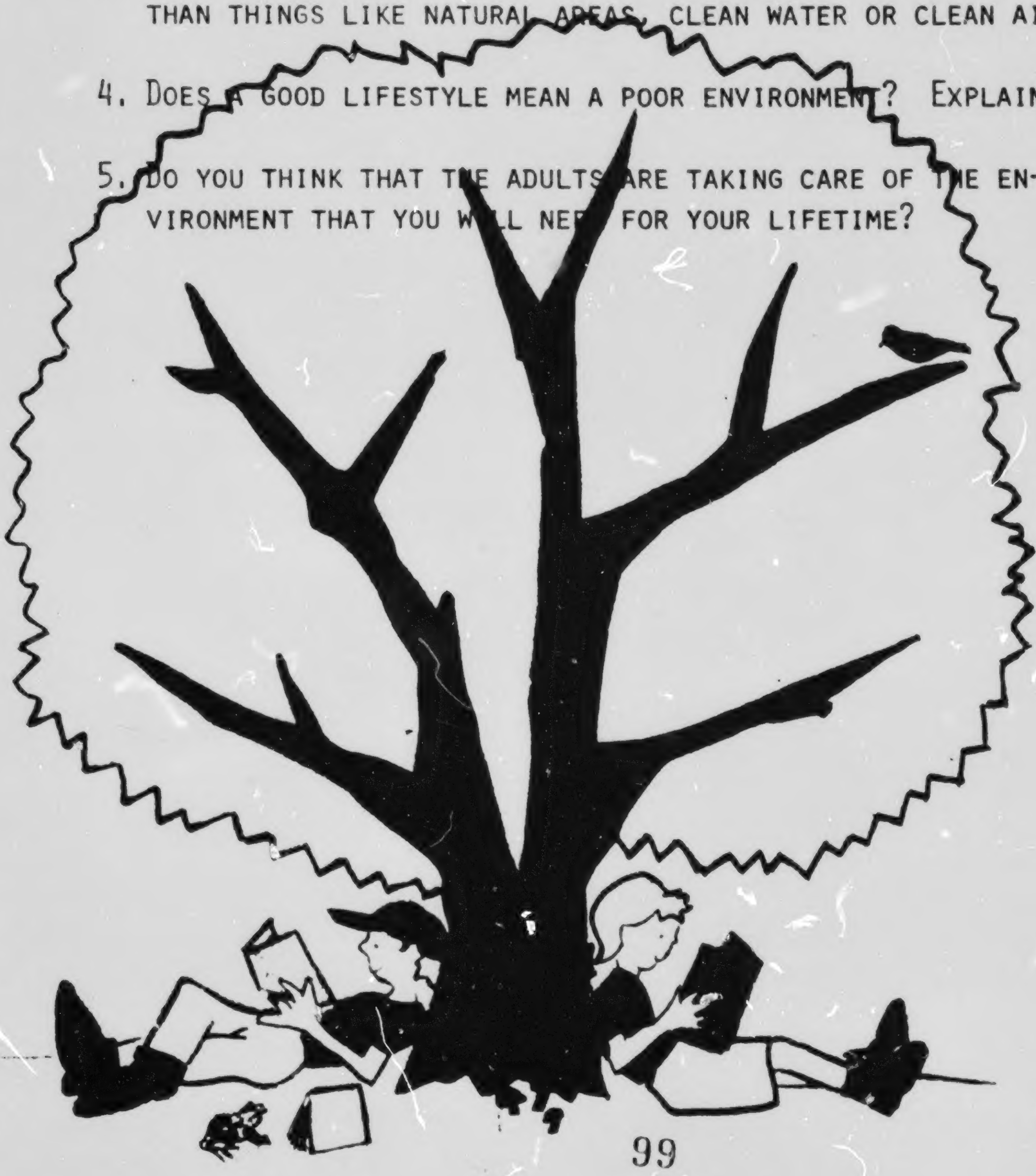
1. IF THE POSSESSIONS THAT WE HAVE HELP TO MAKE UP OUR LIFESTYLE, HOW CAN WE HAVE A GOOD LIFESTYLE AND REDUCE OUR IMPACT ON THE ENVIRONMENT?

2. DO YOU KNOW OF ANY WAYS THAT YOU HELP TO DAMAGE THE ENVIRONMENT?

3. DO YOU THINK THAT PERSONAL POSSESSIONS ARE WORTH MORE THAN THINGS LIKE NATURAL AREAS, CLEAN WATER OR CLEAN AIR?

4. DOES A GOOD LIFESTYLE MEAN A POOR ENVIRONMENT? EXPLAIN.

5. DO YOU THINK THAT THE ADULTS ARE TAKING CARE OF THE ENVIRONMENT THAT YOU WILL NEED FOR YOUR LIFETIME?



## OPTION #3

### MATERIALS AND RESOURCES

Posterboard or newsprint
Glue
Magic markers
Forms 4 and 5

### PROCEDURE:

1. Arrange to have your students bring in old magazines to cut up for collages.
2. Direct them to make a collage depicting why they believe their lifestyle will be like in 2000 AD. Get them to focus in on possessions and conveniences.
3. When they have completed the collages, ask them to use one of the poetry forms to describe what their environment will be like in 2000 AD. (See Forms 4 and 5)

### DISCUSSION QUESTIONS

1. How do you think your lifestyle will change?
2. Do you think that those qualities you like now, i.e. air, water, land use, population will be better or worse in 2000 AD?
3. Does your lifestyle require more or less material possessions than now?
4. Why do you or don't you look forward to the year 2000?

FORM 4

CROSSWORD POEMS RESEMBLE CROSSWORD PUZZLES BECAUSE THEY ARE COMPOSED TO INTERLOCKING WORLDS. WHEN READ TOP TO BOTTOM AND LEFT TO RIGHT, THE INTERLOCKING WORDS FORM A STATEMENT OR SENTIMENT.

EXAMPLE:

```
 H
WAR
 T
DEATH
   E
   A
   R
   SORROW
        H
    EMPTY
      E
      O
      P
      LOVE
      E
```

DEBBY DEFEO

ACROSTIC POEMS ARE POEMS IN WHICH THE FIRST LETTERS OF EACH LINE SPELL OUT THE SUBJECT. EACH LINE DESCRIBES THE SUBJECT IN SOME WAY.

EXAMPLE:

NOTHING GOOD FOR LUNCH
OUT OF CHOCOLATE MILK
ONLY FIVE MINUTES TO EAT
NOISY PEOPLE

ROBERTA MEYER

HAIKU POETRY HAS THREE NONRHYMING LINES, ALL SHORT AND PACKED WITH MEANING. STRICTLY SPEAKING, THE FIRST AND THIRD LINES SHOULD HAVE FIVE SYLLABLES AND THE SECOND LINE SHOULD HAVE SEVEN SYLLABLES - A TOTAL OF SEVENTEEN. BUT MANY HAIKUS VARY FROM THIS.

EXAMPLE:

SOFT, DELICATE FLAKES
OF WHITE ICING COAT THE EARTH
LIKE AN ANGEL CAKE.

SUSY MARTIN

FORM 5

SYLLABLE CINQUAINS ARE FIVE-LINE DESCRIPTIVE POEMS ABOUT ANYTHING. THE FIRST AND LAST LINES HAVE TWO SYLLABLES EACH. IN BETWEEN, THE LINES HAVE FOUR, SIX AND EIGHT SYLLABLES, IN THAT ORDER.

EXAMPLE:

DAYDREAMS
MISTY PATTERNS
WOVEN INTO SOFT HOPES
AND HAZY PROMISES MADE IN
YOUR HEART.

CHRISTOPHER ZABRINSKI

DIAMOND POEMS START AND END WITH NOUNS THAT ARE OPPOSITES. THE POEMS HAVE SEVEN LINES. THE MIDDLE LINE IS LONGEST AND MARKS THE CHANGE FROM ONE NOUN TO ANOTHER. FILL OUT THE REMAINING LINE WITH PARTICIPLES AND ADJECTIVES.

EXAMPLE:

DR. JEKYLL
KIND, GOOD-HEARTED
WORKING, HELPING, SAVING
HUMANITY, COMPASSION - CURIOSITY, LUST
RAGING, HURTING, DESTROYING
EVIL, FIENDISH
MR. HYDE

ANDREW SCHOEN

## SUMMARY DISCUSSION QUESTIONS (FOR USE WITH ALL OPTIONS)

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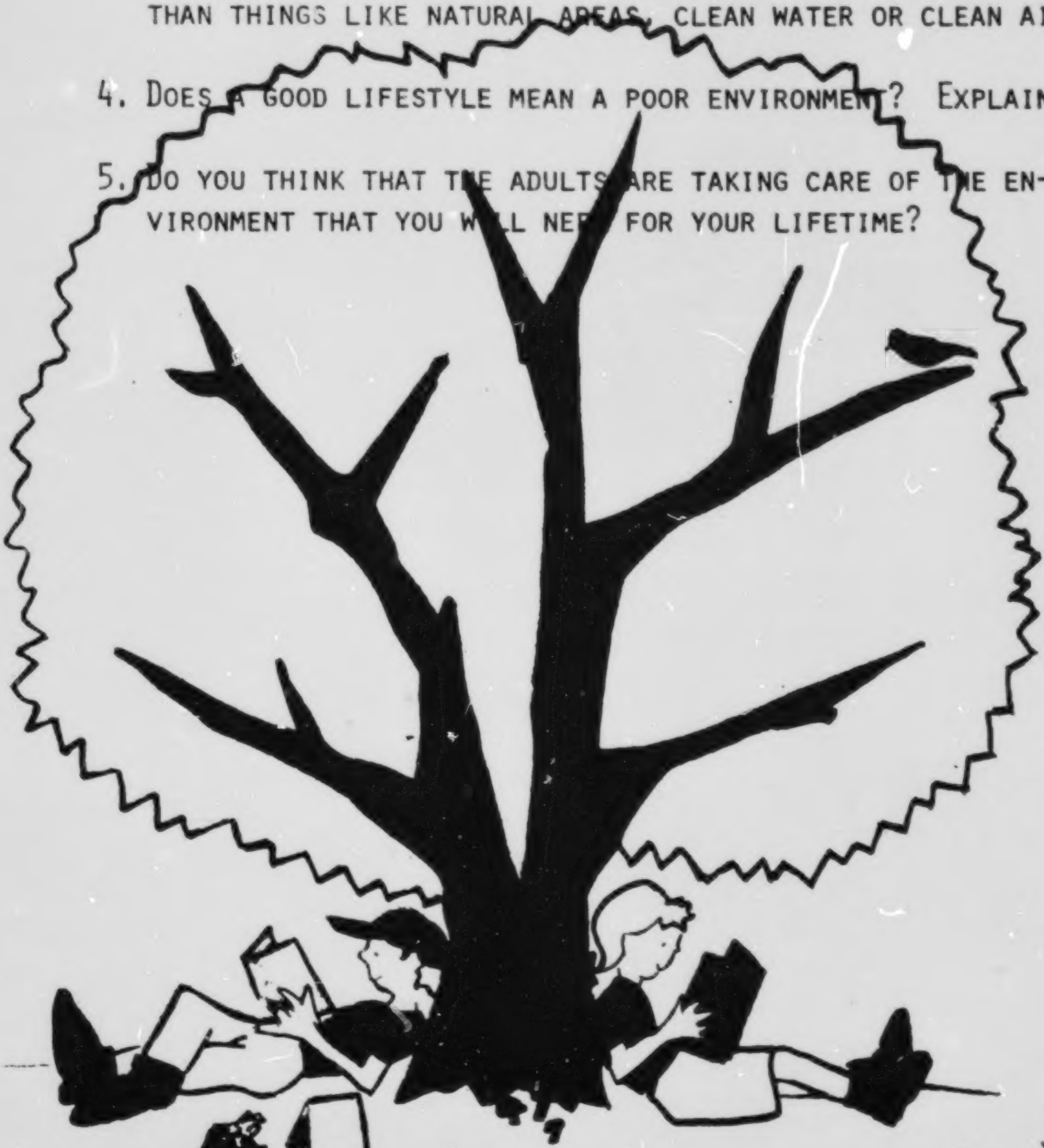
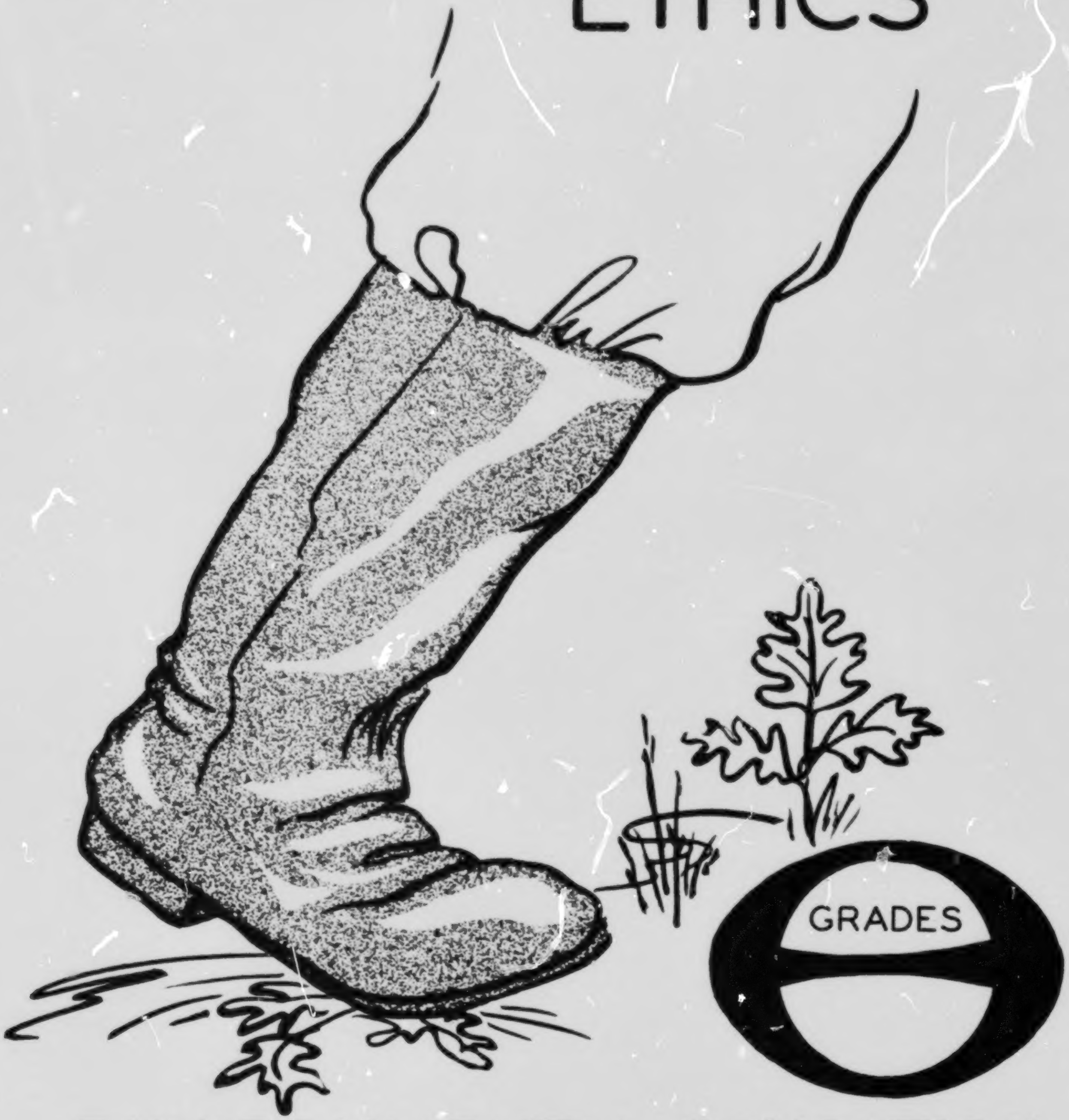


# ENVIRONMENTAL ETHICS



**ENVIRONMENTAL EDUCATION**

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34

TITLE IVC ESEA

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Synopsis

Ethics 5: At the completion of this unit the student will be able to list examples of the excessive or wasteful use of natural resources and to identify the possible consequences of these actions.

Option 1 - Students use filmstrips on energy and art materials to present a concept of what our world will be like in 2000 AD. .. 3
Option 2 - Students determine how much material is thrown out by the school. .. 4
Option 3 - The filmstrip: It's Your World - Welcome To It is used to point out how we abuse our environment. .. 6

Ethics 6: At the completion of this unit the student will be able to give examples of how different lifestyles make different demands upon the environment.

Option 1 - Students use a chart to analyze what demands we place on the environment. .. 8
Option 2 - Students view the film Africa, Living in Two Worlds and analyze how people in Africa cope with the environment. .. 10
Option 3 - Students examine early American lifestyles and their use of resources. .. 11

Ethics 7: At the completion of this unit the student will be able to list things we as individuals can do to care for the earth rather than exploit it.

Option 1 - Students take a nature walk to discover how nature can be preserved. .. 14
Option 2 - Mini environments are created in jars to observe the effects of chemicals. .. 16
Option 3 - Students work with Johnny Horizon materials in a clean-up campaign. .. 18

Ethics 8: At the completion of this unit the student will be able to list important reasons why we should treat the earth in a manner that will permit us to live harmoniously with each other and our environment.

Option 1 - The classroom environment is allowed to become littered to emphasize the need for co-operation in maintaining the environment. .. 23
Option 2 - Students alter four water environments to study the effects of different chemicals. .. 25
Option 3 - Students study community environmental problems to find possible solutions. .. 28

EXPLANATION OF CONCEPT AREA

ETHICS - The goal of any environmental education program should be to assist students in the development of a system of values consistent with our role as stewards of our environment.

To this end we begin with the development of a basic idea of individual needs and the need for sharing. From this we then explore the wonders of our environment.

We then build the concept of stewardship based upon our personal lifestyle and attitudes.

In grades 6-8 we present the idea of man's role in helping to preserve the natural order and the importance of a pleasant environment for now and the future.

In high school the idea of a personal value system is developed and tested for its applicability to our own society and the world environment.

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list examples of the excessive or wasteful use of natural resources and to identify the possible consequences of these actions.

SUBJECT AREAS:

Social Studies, Science, Art, Mathematics

2

OPTION #1 - This unit best follows the study of Energy materials.

MATERIALS AND RESOURCES

Shoeboxes
Manila drawing paper
Watercolors or crayons
Energy and You, filmstrips from SVE, available $E^2$ Office

PROCEDURE:

1. Show the filmstrips listed above. All the filmstrips can be useful but #6 is essential.
2. Ask the students to pretend they are living in 2000 AD and have no electricity or fossil fuels as all natural resources have been depleted. The water, air, and soil are now contaminated.
3. Tell the students to make up a story about a day in their lives in the year 2000 AD. This story may be written, oral, or even illustrated. Dioramas would be acceptable also. If this unit is done as a homework assignment, parents should be encouraged to help.
4. Let the children talk freely about the projects while they are doing them. Try not to influence them when answering factual questions.
5. Allow time for presentations.

DISCUSSION QUESTIONS

1. What problems did you have in the "world of tomorrow"?
2. What caused these problems?
3. Why did Earth's natural resources run out?
4. Was this a necessary occurrence?
5. How could this have been avoided?
6. Would you be willing to use a little less energy and resources so that the "world of tomorrow" will have enough?
7. Who will the people of tomorrow be? (your children)
8. What people need more energy than others?
9. Does anyone deserve more energy than anyone else?
10. Do you waste energy? Why?
11. How can you save energy?
12. Would you be willing to save energy in these ways? For how long?

3

## OPTION #2

### MATERIALS AND RESOURCES

Large scale
Daily chart

### PROCEDURE:

1. The teacher will have to ask permission of the cafeteria or janitor to teach this unit.
2. Weigh cafeteria garbage containers when empty and number them. Then weigh the containers when full, daily for a week.
3. Record all data.
4. If the school has a hot lunch program, compare the amounts of garbage with the types of foods purchased daily.
5. Make a chart of the total weights collected.

### DISCUSSION QUESTIONS

1. Were there great differences in the amounts collected daily?
2. Was any food thrown away that could have been eaten?
3. Did the food served make a difference in the amount of garbage collected?
4. What happened to the garbage after it was collected?
5. What other methods could be used to dispose of the garbage?
6. Why are so many things thrown away that could be eaten?
7. What would happen if these garbage cans were not emptied daily?
8. What animals might come to the school to help clean up the garbage? (animals we would not want to have in the building)

OPTION #2

CHART 1

| Date | Garbage can # | Empty weight | Full weight | Net weight |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
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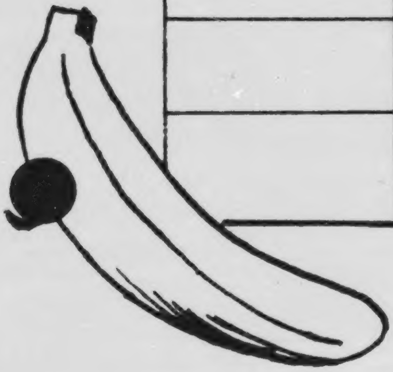


OPTION #3

MATERIALS AND RESOURCES

It's Your World: Welcome To It, filmstrip, available $E^2$ Office

PROCEDURE:

1. Show filmstrip.
2. Have the students make a mural of a natural environment and one of a closed man-made environment.
3. Discuss the murals.

DISCUSSION QUESTIONS

1. What is a resource?
2. How do we waste them?
3. How can we save our resources?
4. Why should we save our resources?
5. What might happen to our world if we use up our resources of fuel, food, land, water, or air?
6. What can we do to save resources?

6

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to give examples of how different lifestyles make different demands upon the environment.

SUBJECT AREAS:

Science, Social Studies, Art

7

## OPTION #1

### MATERIALS AND RESOURCES

Large sheets of paper and marking pens
Drawing paper, brushes and paints and/or crayons
Bulletin board area
Chart I as an example

### PROCEDURE:

1. List the different areas where the children live such as lakes, farms, town, etc.
2. Chart these areas.
3. Add to the chart the differences in people's lifestyles.
4. Make drawings of each area.
5. Discuss how people in each area have different needs.
6. List resources used by each area.
7. Collect pictures and/or illustrations to show the use of these resources (water, fish, machinery, etc.).
8. Add the illustrations to the proper section of the chart.
9. Decide how well these resources are used.

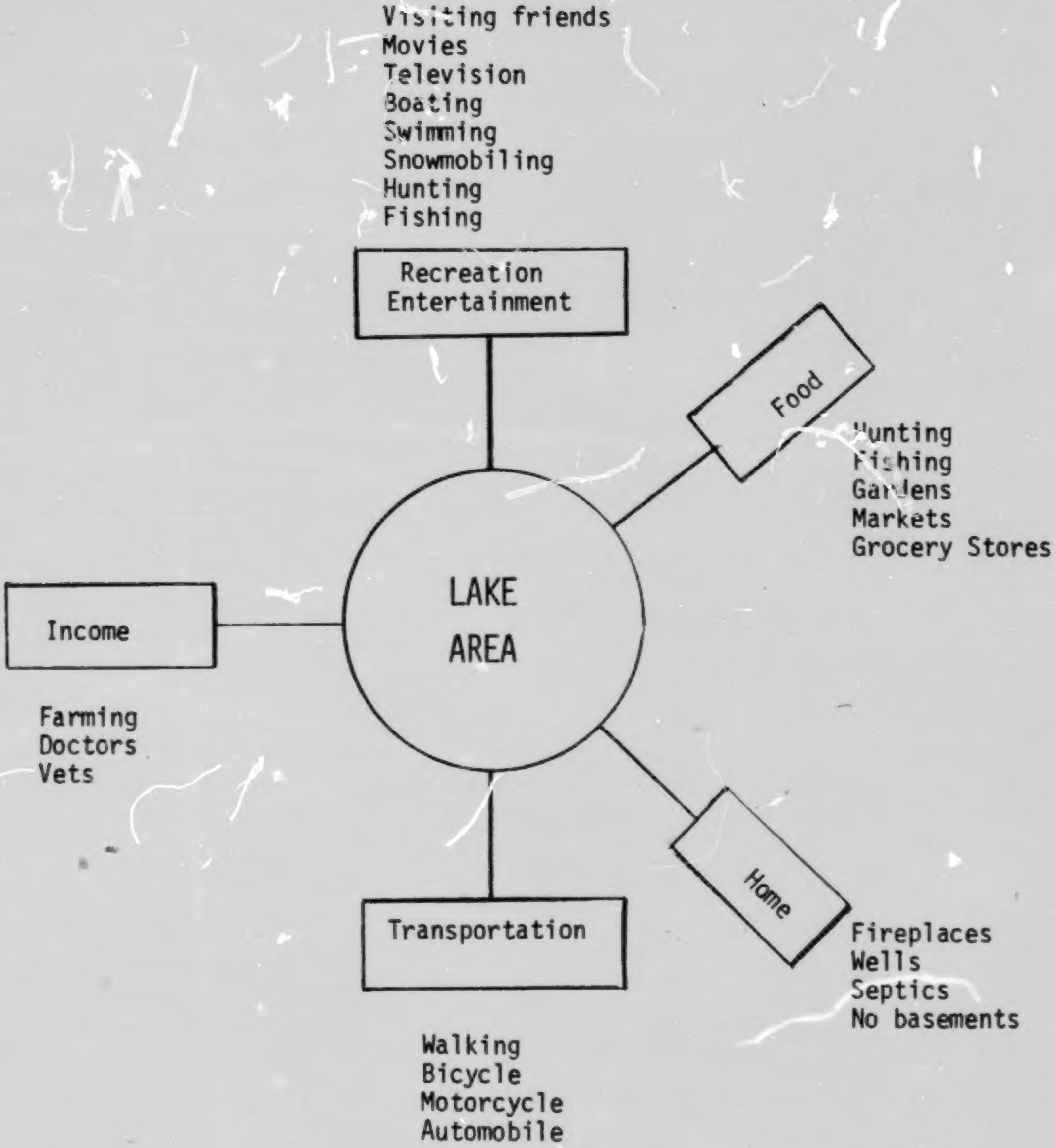
### DISCUSSION QUESTIONS

1. Does any one area or group of people use more resources?
2. Does any group use resources better than the others?
3. In what ways have we changed where we lived?
4. Where has man not changed where he lived?
5. Do you have any ideas on what will happen to these areas - good or bad?

### FURTHER ACTIVITIES

1. Children may decide to delve into more primitive civilization.
2. Compare how primitive man lived as opposed to our lifestyle.
3. Find out how other societies of today compare with ours.

OPTION #1 EXAMPLE CHART


Visiting friends
Movies
Television
Boating
Swimming
Snowmobiling
Hunting
Fishing
Recreation
Entertainment
Food
Hunting
Fishing
Gardens
Markets
Grocery Stores
LAKE
AREA
Income
Farming
Doctors
Vets
Transportation
Walking
Bicycle
Motorcycle
Automobile
Home
Fireplaces
Wells
Septics
No basements

OPTION #2

MATERIALS AND RESOURCES

Film: Africa, Living in Two Worlds, #106 Film Co-op or others that deal with cultures

PROCEDURE:

Show the movie listed above.

DISCUSSION QUESTIONS

1. How does housing in the city differ from housing in the country?
2. Who builds the country houses?
3. Why must they be built that way?
4. How have materials for housing changed in the last 100 years?
5. What evidence is there of the housing of 100 years ago that still exists in Africa today?
6. Which African lifestyle uses less materials?
7. In what ways can we contrast our lifestyle with African lifestyles?
8. How does our lifestyle affect the environment?

FURTHER ACTIVITIES

1. Several filmstrips and cassettes are available from the co-op that can be adapted to this unit. They include the following:

   Family of the Amazon 2-C
   Indian Family of the Andes 2
   Ranch Family of Brazil 2-A

2. A class might be interested in studying ancient cultures and lifestyles. These filmstrips and cassettes are also available from the co-op:

   The Aztecs 4-C
   The Incas 4-A
   The Mayas 4-B

10

## OPTION #3 - Thanksgiving time

### MATERIALS AND RESOURCES

Chart I

### PROCEDURE:

1. Students study early American lifestyle. Make certain they cover early Americans use of water, energy, food, and metals.
2. Distribute two copies of Chart I to each student.
3. Have the students fill it out in as much detail as possible, one for the early American lifestyle and one for his own family's lifestyle.
4. The second chart may be used as a homework assignment.
5. Have the students make a short oral presentation to explain their chart.

### DISCUSSION QUESTIONS

1. Where was the greatest difference in lifestyle?
2. Which lifestyle would you prefer? Why?
3. Did early Americans waste resources? What kind?
4. Do we waste resources? What kind?

11

OPTION #3 CHART I

| | |
|---|---|
| Use of water | EXAMPLE: Washing clothes, drinking purposes, etc. |
| Use of energy | EXAMPLE: Television, riding a horse |
| Types of energy | EXAMPLE: Fire, electricity |
| Use of metals | EXAMPLE: Axe, plow |
| Food sources | EXAMPLE: Grain, soy |

12

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list things we as individuals can do to care for the earth rather than exploit it.

SUBJECT AREAS:

Science, Art, Social Studies

## OPTION #1 - Spring or fall

### MATERIALS AND RESOURCES

Filmstrip on animal habitats
Art supplies

### PROCEDURE:

1. Show a filmstrip on the habitats of animals and discuss.
2. Take the students on a nature walk in a natural area and ask them to observe as much as possible.
3. Students are to make notes on what they see in the area. See Chart #1.
4. Have them note anything they see that helps preserve nature such as litter baskets, specific trails, trail bikes, laws against picking flowers, specific picnic areas, campgrounds, etc.
5. Return to the class room and have the students make dioramas, puppets, a mural, painting or chalk drawing of what they observed on the nature walk. Make certain they include things listed in step #4. If they have nothing listed on their chart, have them include what they feel is necessary to preserve nature.

### DISCUSSION QUESTIONS

1. What types of animals did you see on the nature walk?
2. What types of plants were found?
3. Did you hear any birds you did not see?
4. What kinds of litter did you see?
5. What did you especially enjoy about the walk through the area?
6. Can you think of reasons why some of the animal life would inhabit this particular environment?
7. How would you feel if you knew that some day this area would be destroyed because of a road being built here?
8. Why do people enjoy having a nature trail near them, especially one that is located within city limits?
9. What would happen to the animals if we would change the environment?
10. Who must keep the nature centers "natural"?
11. How can we as individuals help?
12. Why should we help?

14

OPTION #1

OBSERVATION CHART #1

| PLANT OR ANIMAL SEEN | PLACE IT LIVES |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |
| 8. | |
| 9. | |
| 10. | |

15

## OPTION #2

### MATERIALS AND RESOURCES

½ pint milk cartons
Bean seeds
Art supplies
Graph paper
Pictures of natural resources, available $E^2$ Office

### PROCEDURE:

### PART 1

1. Prepare the children with a discussion of what man does to places where he lives and what animals do to their area.

2. Plant several milk cartons with bean seeds.

3. Children may choose different products they use every day and add them to milk cartons already filled with water and plants. CAUTION: Add ½ tsp. at a time.

4. Have a couple of control cartons and compare them to what has happened in the others. The children may add oil, gas, salt, soap, etc. Label the cartons accordingly.

5. Observe the cartons daily and record which additives are deadly to plants.

### PART II

1. Have the class draw a mural of man and his environment - the before and after of man.

2. The ideas can come from a discussion of how man's needs differ from those of animals or primitive man.

3. Discuss how we use resources and waste them.

4. Discuss environmental problems we face. Ask the students to think of answers.

5. Write a short paragraph about what we can do as caretakers of the earth about each problem.

6. Paragraphs could be read aloud and discussion used with those wanting to illustrate or make dioramas.

7. Collect pictures of misused areas for a bulletin board display.

OPTION #2 con't

DISCUSSION QUESTIONS

1. What does man need to survive?
2. What do animals need to survive?
3. Does man really need so much more than animals?
4. What things do we use every day that can be bad for nature?
5. When we have polluted water, what do we do with it?
6. What happens to our own pollutants?
7. How can we help at home and at school?
8. What animals have become extinct?
9. What are some of the reasons for these animals becoming extinct?
10. What happens to an industry when it has run out of the resources it uses for its manufacturing process?
11. How have we shown changes man has made on nature?
12. Would your solution for an environmental problem work?
13. Would there be any side effects to your solution? Explain.
14. Would your solution help one problem but cause another?

17

OPTION #3

MATERIALS AND RESOURCES

JOHNNY HORIZON Clean Up America materials
Paper bags
Ditto sheets
Speaker on conservation

PROCEDURE:

1. Schedule a speaker for a classroom talk on ways people abuse our environment. If possible, plan a fieldtrip and incorporate the talk and the trip together. After the talk arrange a trip around the school grounds to show the children destruction caused by man.

2. Review the talk. Emphasize things your class can control by themselves.

3. Allow the children to choose one of the following activities to be completed with parental permission and help. Be certain to send home project plan copies and permission slips.

   a. Find a heavily littered area that you can clean up and possibly plant a flowerbed.
   b. Take an environmental survey of your surroundings and use the survey chart to record your feelings.
   c. Find three examples of air, water, or noise pollution in your family surroundings or neighborhood and try to clear up those problems.
   d. Tally seven days of your family's use of any motorized vehicles. Then try to suggest ways to lower the number of times used. Keep another seven day tally and compare it to the first.
   e. For seven days tally the amount of paper and lights or electricity sources left on when not in use. Then for another seven days see if you can limit your waste and keep another tally.

4. After the return of the signed parental permission slips, break the children into groups according to their choice and explain in detail their specific projects. Give out the needed forms.

5. In the seven day span pass out materials and hold discussions about being "stewards" of the earth. Also check their progress and problems.

6. On the final days collect the charts and allow enough time to completely discuss the basic concepts.

7. After evaluation of forms, spend one day having them share their findings using the forms, experiences, etc.

DISCUSSION QUESTIONS

1. Did you find it difficult to complete your project? If so, which part(s)?

2. Did your family help you and cooperate on your project?

3. Did you feel good about doing something good for your earth?

4. Do you feel children can help to keep our country beautiful?

18

OPTION #3 con't

5. Besides these five projects our class did, how else can we be stewards of the earth? Examples: limiting destruction, recycling drives, caring for pets, caring for plant life, etc.
6. What will happen to our trees if we do not take care of them?
7. What will happen to our water if we do not take care of it?
8. What will happen to our air if we do not take care of it?
9. What will happen to our soil if we do not take care of it?
10. Would it be easy to do something for our earth every day of our lives?
11. Do you think everyone should start to care for our earth? Why or why not?

FURTHER ACTIVITIES

1. Discuss when man was primitive he needed less and survived with less.
2. Draw early man.
3. Children may write poems about man and where or how he lives.
4. The class may develop a timeline showing man's development and the resources he uses as he develops.

OPTION #3

## ENVIRONMENTAL SURVEY CHART

You will be looking around your homes, school and town checking on the following things. At the end we will add up the numbers and you will have a score. Let's see what kind of earth being you are.

| | Number of pieces | Scale for points | Total |
|---|---|---|---|
| 1. Litter<br>on street<br>in school | | | |
| 2. Garbage<br>messy piles<br>uncoverd cans<br>construction debris | | | |
| 3. Defacement<br>to road signs<br>to walks<br>to desk, etc<br>broken windows | | | |

POINT SCALE

| | | |
|---|---|---|
| 0 | Perfect | 0 |
| 1-10 | Excellent | -5 |
| 11-20 | Good | -10 |
| 21-25 | Fair | -50 |
| 26+ | Poor | -100 |

20

| POLLUTION PROBLEM | HOW TO SOLVE | SOLUTION ACTUALLY USED |
|---|---|---|

21

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list important reasons why we should treat the earth in a manner that will permit us to live harmoniously with each other and our environment.

SUBJECT AREAS:

Social Studies, Art, Mathematics, Science

OPTION #1 - This unit will work best in a self-contained classroom. No materials are needed.

PROCEDURE:

1. A simple values clarification game may be played. The following questions can be asked requiring a response of "yes" or "no":

   a. Would you rather
      (1) pick up and throw away a piece of litter you see in the hall or
      (2) leave a piece of litter where it is so that someone else can pick it up?

   b. Would you rather
      (1) make people care about the environment or
      (2) make it against the law to litter?

   c. Would you rather
      (1) have a clean house or
      (2) have a messy house because it doesn't bother you?

   d. Would you rather
      (1) see a nice green lawn or
      (2) see a lawn filled with papers and garbage?

2. Contact the custodian asking him NOT to clean your room until further notice. Make no rules regarding littering in the classroom and never mention litter. Each day more and more litter will accumulate. Student irritation at the situation will grow until they begin to start asking about the condition of the room. Answer their questions simply and truthfully. Their questions will lead right into a discussion.

DISCUSSION QUESTIONS

1. Where did the litter come from?

2. Why do people litter?

3. Is litter pleasant?

4. Do you want this condition to continue?

5. What should we do with the litter? Follow the students suggestions and emphasize that the students along with the teacher are responsible.

6. Is littering a way of life that is what we want?

7. Who can stop littering?

8. Would less littering make our environment better?

9. What does litter do to our environment?

10. Did you pick up the papers on the floor or just leave them there?

23

OPTION #1 con't

11. Did you encourage others to help keep things clean or did you tell them they could not litter?

12. Did you help to have a clean room or a messy one?

13. Who is responsible for the room?

24

## OPTION #2

### MATERIALS AND RESOURCES

Filmstrip, Rivers Must Not Die, Centron Environmental Studies Series
One pound of rapid grow fertilizer
One pound of soil
Four (4) glass gallon jugs
Measuring cup
Several water plants
Goldfish and guppies
Motor oil

### PROCEDURE:

1. Fill all the jugs 75% full of water and let sit for two days.
    a. Group 1 prepares a jug of water and goldfish.
    b. Group 2 prepares a jug of water, two cups of soil, and a water plant.
    c. Group 3 prepares a jug of water, two cups of soil, a plant,and two tablespoons of fertilizer.
    d. Group 4 prepares a jug of water and two tablespoons of motor oil.
    e. Add four guppies to each jug and put the jars in sunlight
2. Using the film above discuss algae and the effect of algae in streams to motivate interest. NOTE: Stop the cassette when the narrator asks, "What happens when the food chain in a river is broken?"
3. Divide the class into four groups.
4. Provide a chart for each student.
    a. Record data and observations on a separate sheet.
    b. Record observation of jars.
5. Discuss observation of changes in jars noted on the chart.

### DISCUSSION QUESTIONS

1. What is algae and how is it formed?
2. Is algae beneficial or non-beneficial to a stream according to the filmstrip?
3. Without algae present in a stream what kinds of wildlife would be around the stream? In the stream?
4. With algae present in a stream what kinds of wildlife would be around the stream? In the stream?
5. How does the lack of game fish in a stream affect the wildlife around the stream?
6. Discuss our charts and observations related to the experiments:

25

OPTION #2 con't

- a. Is algae present?
- b. In which jar is it most present?
- c. What jar if any does not have algae present?
- d. Is an odor present from the jars?
- e. How does the algae look?

7. Can you draw any inferences between how we live and what we use and how we use it? Can this affect the lives of people we do not know and wildlife we cannot see which live downstream?

8. What was necessary to support life?

9. What killed the plants and fish?

10. What is polluted water?

11. Did the dirty, muddy water in jar 2 kill the fish or plants?

12. Is dirty water necessarily polluted water?

13. What kind of pollutants do individual people put in water?

14. Can this be stopped? How?

CHART 1

OPTION #2

| | WATER COLOR | PLANT APPEARANCE | FISH APPEARANCE | GENERAL STATE |
|---|---|---|---|---|
| 1ST DAY | | | | |
| 2ND DAY | | | | |
| 3RD DAY | | | | |
| 4TH DAY | | | | |
| 5TH DAY | | | | |

| | WATER COLOR | PLANT APPEARANCE | FISH APPEARANCE | GENERAL STATE |
|---|---|---|---|---|
| 1ST DAY | | | | |
| 2ND DAY | | | | |
| 3RD DAY | | | | |
| 4TH DAY | | | | |
| 5TH DAY | | | | |

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## OPTION #3

### MATERIALS AND RESOURCES

Cameras and film
Pictures of community environmental problems
Art supplies such as magic markers, crayons, posterboard, paint, paper and chart paper
Cassette tape recorder
Slide projector

### PROCEDURE:

1. Showing students various pictures of community environmental problems, have students discuss how these problems were created and why. Using the chart paper, record and post the responses along side each picture.
2. Ask the students if there are any similar community environmental problems in the school's community; write down the responses on chart paper and also place key words that seem to come up often for possible spelling vocabulary list.

   For example: Pollution, Garbage, Trash, etc.
3. Have students in teams of six survey the immediate school site for any of the suggested items above. Have each group take slide pictures of each problem they find.
4. Show the developed slides of the school site's environmental problems to the class. Discuss whether the problems identified by the students are bad and if so, what are some ways to change them and enchance the school's appearance.
5. Discuss who might have created the problem in the beginning and who should be responsible for the cleaning up and maintaining a good school site appearance.
6. Have the students draw pictures of how they as individuals would be responsible for cleaning up the environmental problems around the school.

### DISCUSSION QUESTIONS:

1. What happens when it rains on concrete and asphalt?
2. What should be the role of parents in terms of maintaining an attractive neighborhood?
3. Do you care about the survival of existing animals and plants in the neighborhood?
4. In what ways do you show responsibility for your neighborhood?

# ENVIRONMENTAL DECISIONS

## ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE
ANTIOCH COMMUNITY SCHOOL DISTRICT 34
TITLE IV C ESEA

134

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Option 1 - The Day They Parachuted Cats on Borneo is used to show students the importance of assessing effects. .. 22
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## EXPLANATION OF CONCEPT AREA

DECISIONS - For students to be effective in solving environmental problems they must have numerous experiences in a learning situation. By solving carefully selected problems they acquire the necessary skills and build their confidence.

Program activities begin by defining decisions and the responsibility for decisions.

In the second sequence we identify the aspects of sound decisions and their relationship to individual attitudes. We also explore the ideas of consequences and time span for decisions.

The junior high program attempts to identify the various components of complex decisions as they relate to decision-makers. From this we develop the ideas of effects and enforcement of decisions as they relate to individuals, society, and the law. We also begin to develop the concept of responsibility for decisions.

In high school we devote much of our efforts to involving students actively in the decision-making process. They are encouraged to practice their personal values and examine their relationship to society in general. Decisions take on new signicance as the student becomes involved with groups whose interests may be different from his. We also explore the effect of using laws to effect environmental improvement.

## DECISIONS 3

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify one of the many problems in our environment and its many manifestations and suggest effective solutions.

SUBJECT AREAS:

Science, Social Studies, Mathematics

2

## OPTION #1

### MATERIALS AND RESOURCES

Bags
Buckets or barrels to deposit litter in

### PROCEDURE:

1. Take the children to the playground and ask them to pick up any litter but record on paper what they pick up.

2. Deposit the trash in the proper place.

### DISCUSSION QUESTIONS (outside if possible)

1. What kind of litter did you see most?

2. Why do you think it was left?

3. What kind of person do you think left it?

4. Where did you find the most litter?

5. What kind of litter did you find the least of?

6. What could be done with the litter?

7. What species besides man left the litter?

8. What could be done to stop littering?

9. Is littering a disease or a symptom of one? Why or why not?

10. Who do you think people litter?

11. Do you think we can change that? How?

3

## OPTION #2

### MATERIALS AND RESOURCES

Environmental Awareness In The City, Centron FS/C

### PROCEDURE:

1. Show the filmstrip with no cassette.
2. Have the students list on the blackboard the good and bad pictures in the filmstrip.
3. Next check off those causes the students feel a part of or a partial cause of. For example, pollution due to litter or using a car.
4. Discuss with the students what might be possible solutions to the problems. Make sure students identify what they as individuals could and would do.

### DISCUSSION QUESTIONS

1. Who else must work toward cleaning up our world?
2. How can you get them to help?
3. Can you solve the problem right away?
4. How long might it take?
5. How long are you willing to work at the solutions?
6. What would you do if the solution didn't work?

## OPTION #3 - two weeks in late spring

### MATERIALS AND RESOURCES

Seven gallon-size glass jars with covers
Seven established plants, large leaf like geraniums
A rubber hose that can be attached to the exhaust of an internal combustion engine
Potting soil or black dirt and gravel for drainage
Filmstrips on photosynthesis
Chart 1

### PROCEDURE:

1. Show the filmstrip(s) and discuss how a plant produces food.
2. Place one plant and enough soil in each jar. Allow the plant to get established and begin growing in the jar for one week. Label the jars #1 - #7. Record their general appearance at the beginning of the experiment.
3. On the first day of the second week, let exhaust flow into the jars.
    - a. Jar #1 - 15 seconds daily   Record appearance.
    - b. Jar #2 - 30 seconds daily   " "
    - c. Jar #3 - 60 seconds daily   " "
    - d. Jar #4 - 15 seconds twice daily   " "
    - e. Jar #5 - 30 seconds twice daily   " "
    - f. Jar #6 - 60 seconds twice daily   " "
    - g. Jar #7 - no exhaust - control jar   " "
4. Repeat the procedure for one week and record observations on days 1, 3, 5 and 12.
5. Make a graph showing the detrimental effects of the increased amounts of exhaust over a two week time period.

### DISCUSSION QUESTIONS

1. What gases do plants use in photosynthesis?
2. What is the difference between carbon dioxide and the exhaust of an internal combustion engine?
3. What happens to the plants that have been exposed to exhaust?
4. Was there any color change in the plants?
5. How long did it take for the plants to start turning yellow?
6. What is causing the plants to die? (not only the increase of carbon monoxide but the decrease of carbon dioxide and oxygen)

### REFERENCES AND RESOURCES

Flowering Plants: Their Structure and Function, #32 N. Lake County Film Co-op

It's Our Choice, Vick Knight Jr. and John E. Moore; Globe Book Company, Chicago, 1972, available $E^2$ Office

Nurseymen and landscapers

CHART 1

DITTO

| JAR | START | DAY 1 | DAY 3 | DAY 5 | DAY 12 |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |

# DECISIONS 4

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will consider not only his personal feelings but the feelings of others as well before making a final decision on a problem.

SUBJECT AREAS:

Art, Social Studies

7

OPTION #1

MATERIALS AND RESOURCES

Bake sale items

PROCEDURE:

1. Have each person bring bakery goods to sell to others.
2. Have the bake sale or a candy sale.
3. After the sale ask the class what they feel the money should be spent on. Have each student suggest something and why it is the best thing for the group.
4. Try to get the students to decide on something that would benefit everyone and the environment.

DISCUSSION QUESTIONS

1. Why is it better to consider everyone's feelings when a decision is to be made?
2. Did you feel the right decision was made? Why or why not?
3. What decisions have been made that you feel were not right?
4. How can you influence decisions that are made by the major or other council members?
5. Did anyone feel left out?
6. Can everyone be happy about a group decision? Why not?

8

OPTION #2 - early fall

## MATERIALS AND RESOURCES

Film: Environmental Enrichment: What You Can Do About It, available E$^2$ Office

## PROCEDURE:

1. Assign three or four students to groups and have them survey what play equipment is available and what things might be added to the playground.
2. Have the students list on the blackboard the things they wish to add to the playground equipment.
3. Students are to discuss why they wish to see the equipment added.
4. Have the students vote on the things they wish to see added.

## DISCUSSION QUESTIONS

1. Is there always something to do on the playground?
2. What equipment is always used at recess?
3. Which pieces of equipment are seldom used?
4. Should there be more room to play or more equipment to play with? Why?
5. How often is the playground used?
6. Why is a playground important?
7. Who uses the playground besides the school children?
8. If picnic benches were added to the playground, what other groups might use them?
9. Why is it importnat to think of many people before a playground is used?

## OPTION #3

### MATERIALS AND RESOURCES

Treehouse, BFA film

### PROCEDURE:

1. Tell the students that the film is about a true story of a boy about their age.
2. Show the film and make no comment about the sudden ending.
3. Ask them what they would do if it was their treehouse?
4. List all their suggestions on the blackboard.
5. Cross out all the suggestions which do not consider the feelings of others in the issue.
6. After discussion show the film again and point out the homes around the treehouse.

### DISCUSSION QUESTIONS

1. Did the bulldozer operator consider Mike's feelings? How do you know?
2. Why don't we think about others when we are making decisions?
3. Is it important to think about others? Why or why not?
4. What do you think is the best solution to this problem?
5. What other problems have you had to find solutions for? Did you think of others then?

# DECISIONS 5

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify in a given situation the alternatives and the consequences of alternatives before making an environmental decision.

SUBJECT AREAS:

Social Studies, Art, Language Arts

11

OPTION #1 - two weeks, about one hour daily

## MATERIALS AND RESOURCES

Map I
Pens, pencils, and crayons
Rulers
Large paper for a mural drawing
Old magazine pictures
Land Use picture #16: Our Environment: Problem or Promise?, available $E^2$ Office

## PROCEDURE:

1. Post the picture and make an enlarged grid map of Map I.
2. Explain to the students that they are to plan a community or subdivision. Do not deal with factories or cities.
3. Discuss with the students, generally, what must be done, what animals will be displaced, etc.
4. Have the students choose committees or sign up for committees.
    a. Kinds of homes
    b. Businesses (where, what kind)
    c. Recreational areas (parks, marinas, lakes, etc.)
    d. Services such as fire, police, etc. (what and where)
5. Have the committees decide which of their items will be necessary and where they plan to locate.

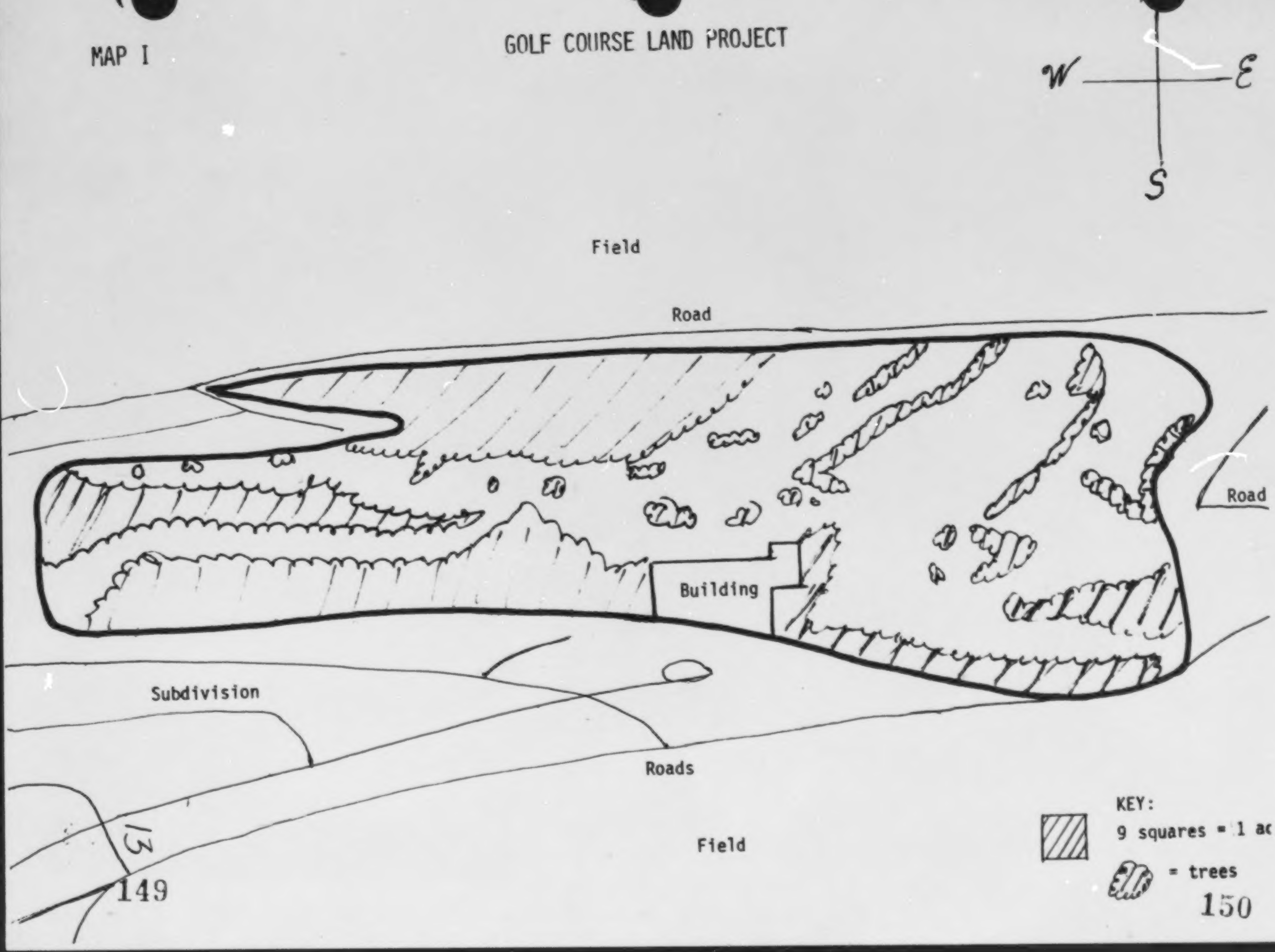
## DISCUSSION QUESTIONS

1. Why is it good land for homes? Why not?
2. What provision is necessary for utilities before they can use it?
3. Discussion of location - Main highway - lesser highway.
4. What will be done with sewage?
5. Which will be better, high rises or acre lots? Why?
6. What location would be best? On the corner, in the middle of the block, or in the center of the complex?
7. What effect would the contour of the land have on the kind of buildings?
8. What recreational facilities would we need?

12

MAP I

# GOLF COURSE LAND PROJECT


W
E
S
Field
Road
Road
Building
Subdivision
Roads
Field
KEY:
9 squares = 1 ac
= trees

## OPTION #2

### MATERIALS AND RESOURCES

Paper bags
Colored yarn or string
Glue
Scissors
Pieces of fabric

### PROCEDURE:

1. Example situations:

   A meadow will become a housing development.
   A tree will be cut down.
   Sewage is being dumped on a prairie.

2. Have each student construct a paper bag puppet. These can be of people, animals, trees, or plants. Make sure you have a variety of characters.

3. Students are given a situation and they act out their feelings of the situation. Give them some time for preparation.

4. Use a desk top or stage area to hold the plays.

### DISCUSSION QUESTIONS

1. What effect did these changes have on the plants and animals?

2. Can changes be made for the good? How?

3. What things can be done so that man does not ruin nature?

4. How do you feel when changes occur to change the environment?

5. Who selects the use for a particular piece of property?

6. What uses can you find for the land in each of these situations?

14

OPTION #3

MATERIALS AND RESOURCES

People of the Forest module, available $E^2$ Office
Cassette recorder

PROCEDURE:

1. Show the filmstrips, Meeting Basic Needs and Cooperation and Division of Labor.
2. Read the teacher's guide to migrations.
3. Set up and play the game.
4. After the game show the filmstrip, Conflict and Social Change.

DISCUSSION QUESTIONS

1. What do you think you did wrong?
2. What could you have done differently?
3. How could you improve the situation?
4. How was your environment helpful to you?
5. How did the environment hurt you?

# DECISIONS 6

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to solve environmental problems and then list consequences that developed and were not thought of previously.

SUBJECT AREAS:

Science, Social Studies

OPTION #1 - This unit takes about three weeks to complete the experiment and a class period or two for discussion of the results.

## MATERIALS AND RESOURCES

Five (5) gallon glass jars
Garden soil
Three (3) small plastic bags
One (1) paper bag, torn into small pieces
Three (3) cups of fresh duck manure
Three (3) cups of Turfbuilder +2 Fertilizer
Five (5) established geraniums
Chart for recording results

## PROCEDURE:

1. Fill each jar halfway with soil and water.

2. Number the jars 1-5 and add the following:

   a. In jar #1 add the plastic bags.
   b. In jar #2 add the torn up paper bag.
   c. In jar #3 add the manure. Fresh duck manure is essential since this natural fertilizer when fresh is too acidic and will kill plants.
   d. In jar #4 add the turfbuilder +2 fertilizer.
   e. Jar #5 is a control jar. Add only water.

3. Cover the additives with the remaining soil.

4. After a week study each jar for evidence of decay.

5. Record your findings on the chart.

## DISCUSSION QUESTIONS

1. What things decayed?

2. What things did not decay?

3. Did any of the plants die? Which ones and why?

4. Did you figure some plants would die?

5. Did you learn ahead of time the effects of the different materials on the flowers?

6. Could you have known all of the consequences before you began? (No, because there was no need to seek out the consequences.)

7. What would happen if decay was not a part of a food chain?

8. What environmental problems arise when man buries trash that does not decay?

9. How can these problems be solved?

17

OPTION #1

## CHART FOR RECORDING OBSERVATIONS

(AMOUNT OF DECAY OF OBJECTS IN 3 WEEKS)

| | DECAY DURING FIRST WEEK | | | DECAY DURING SECOND WEEK | | | DECAY DURING THIRD WEEK | | |
|---|---|---|---|---|---|---|---|---|---|
| OBJECTS | NONE | SOME | MUCH | NONE | SOME | MUCH | NONE | SOME | MUCH |
| 1 PLASTIC BAG | | | | | | | | | |
| 2 PAPER BAG | | | | | | | | | |
| 3 MANURE | | | | | | | | | |
| 4 TURFBUILDER | | | | | | | | | |
| 5 CONTROL JAR | | | | | | | | | |

18

OPTION #2 - The teacher should familiarize himself with the rules of the game prior to playing. The game itself should take one hour of classtime.

MATERIALS AND RESOURCES

Coca-Cola Game, available $E^2$ Office

PROCEDURE:

1. Introduce the Coke game and explain the rules.
2. Let the children express their roles freely as the game is played.
3. Activity near the gameboard should be encouraged.

DISCUSSION QUESTIONS

1. What decisions did you make that increased population?
2. What decisions hurt the environment?
3. What decisions helped man and did not hurt the environment?
4. In real life whose feelings influence decision-making?
5. Would all effects of decision-making be immediate?
6. What are some effects that would take place over a period of time?

## OPTION #3

### MATERIALS AND RESOURCES

People of the Forest module, available $E^2$ Office

### PROCEDURE:

1. Have the students play the survival game and read the instruction booklet (small group activity).
2. Display the mural, "Cave of the Elk Spirits".
3. Direct the students to write a descriptive story dealing with what materials they feel are necessary for survival in that situation.
4. Have the students read their stories aloud.
5. Discuss with the students the differences between the ideas of what is needed for survival.

### DISCUSSION QUESTIONS

1. Did you think of all the needs presented? Why not?
2. Are all the items mentioned necessary?
3. How could you find out if they are necessary?
4. Does the environment provide everything you need?
5. Is there enough in the environment?
6. What happens when the population increases?

# DECISIONS 7

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to make an environmental decision and be able to list possible future effects.

SUBJECT AREAS:

Science, Social Studies, English

OPTION #1

MATERIALS AND RESOURCES

The Day They Parachuted Cats on Borneo, a play by Charlotte Pomerantz, available $E^2$ Office

Optional: costumes of a simple nature

PROCEDURE:

1. Read the play to the class.
2. If desired, let the class put on their own play based upon the book. This could be done very simply as the teacher desires.

DISCUSSION QUESTIONS

1. What was the problem on Borneo?
2. What did man do to get rid of the mosquitoes?
3. What is DDT?
4. Discuss the meaning of side effects and then ask what side effects or consequences the use of DDT had.
5. How did man handle the death of the cats and the onset of rats?
6. Were the rivers affected by DDT?
7. What did our country do to avoid the trouble of Borneo happening again?
8. If they didn't do this, how long would the DDT's effect last?
9. When we handle one environmental problem, what must we also consider?
10. If we think only of now, what might happen in the future?

## OPTION #2

### MATERIALS AND RESOURCES

SVE Study Prints, available $E^2$ Office

Large Animals of North America, Group I and Group II
Nature's Communities: Forest Develops
Nature's Communities: Deciduous Forest
Nature's Communities: Freshwater Pond

### PROCEDURE:

1. Gather pictures of beautiful scenery, wildlife, and various national and state parks.
2. Discuss national, state, and city parks and lead into how changes have occurred.
3. Have each child choose a park to learn about and find the answers to the following questions:
   a. Why is it important how close is it to the nearest town?
   b. What has happened to the areas around the entrance?
   c. What could be done to get it back to its natural state?
4. If possible take a field trip to a national and/or state park.

### DISCUSSION QUESTIONS

1. Why were parks set up?
2. What has happened to the entrance to many parks?
3. Why have motels and businesses grown up at the edge?
4. Why should you stay away from wild animals?
5. What part must you play in keeping the park in its natural state? Why?
6. What has happened to parks where they had narrow roads to see parts of the park?
7. As a result of so many roads being built, what is being replaced?
8. What has happened to the wild animals?
9. What happens to areas around campgrounds?

OPTION #3

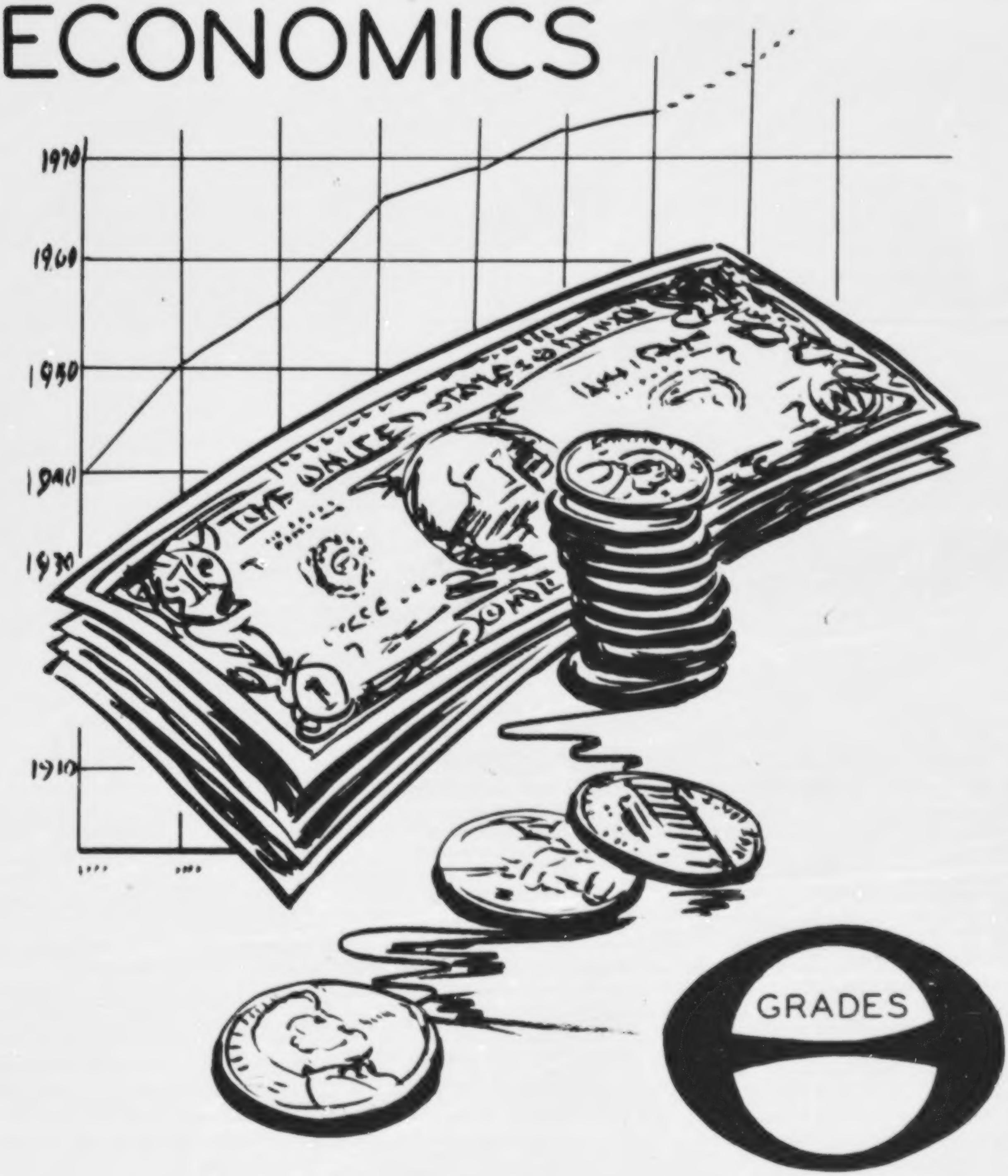
MATERIALS AND RESOURCES

People of the Forest module, available $E^2$ Office
Cassette tape recorder

PROCEDURE:

1. Play the tape, "Laughing Water's Promise".
2. Have the students write the completion to the story.
3. Complete role-playing situation by discussing how each person would solve the problem and why they chose their solutions.
4. Emphasize the role of the environment in the situation.

# ECONOMICS


1970
1960
1950
1940
1930
1910
THE UNITED STATES OF AMERICA

GRADES 8

# ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34
TITLE IVC ESEA

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Synopsis

Economics 3: At the completion of this unit the student will be able to demonstrate the importance of value and variety of resources.

Option 1 - Students make money by selling junk art. ... 3
Option 2 - Collection of newspapers is used to identify the value of a resource. ... 4
Option 3 - The film, "America's Endangered Species, is used to demonstrate the value of wildlife. ... 5

Economics 4: At the completion of this unit the student will be able to list examples of the trading of a man's time and skills at his job to the wages or income he receives.

Option 1 - A visit to a factory is used to show conditions under which men work. ... 7
Option 2 - The film, Why do Fathers Work, is used to show how parents earn income. ... 8
Option 3 - Students make paper logs out of old newspapers to be sold as a product. (This unit can be used after and as a completion to Economics 3, Option 2.) ... 9

Economics 5: At the completion of this unit the student will be able to demonstrate how demand affects the cost of a product.

Option 1 - Rewards are used to show how competition affects cost. ...15
Option 2 - Tokens are sold to show the effects of demand upon cost. ...16
Option 3 - Economics for Primaries, QED, is used to show how the public can affect prices. ...17

Economics 6: At the completion of this unit the student will be able to list tactics used to sell products.

Option 1 - Students make up advertisements. ...19
Option 2 - Students watch a TV program and analyze its commercials. ...20
Option 3 - Students analyze magazine ads to see how people are persuaded to buy products. ...22

## EXPLANATION OF CONCEPT AREA

ECONOMICS - To develop a good understanding of the decisions that will be made concerning our environment we must understand some basic economics.

We begin the study of economics with the identification of sources of money and how it is distributed. The concrete facts of money as it relates to our daily lives.

These are further developed into an understanding of wages being a result of work and the importance of man's use for resources. We then develop the basics of supply and demand by examining the role advertising and its importance to demand.

In grades 6-8 we explore the standard of living in relation to the level of technology and economic system developed by the society. This knowledge is then expanded to assess the role of economics in determining environmental quality.

In high school we explore economic systems, levels of benefits, and the use of the cost/benefit equation to assess the merit of technology in modifying the environmental quality.

# ECONOMICS 3

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to demonstrate the importance of value and variety of resources.

## SUBJECT AREAS:

Science, Art, Mathematics, Reading, Writing

## KEY WORDS:

| | |
|---|---|
| Recycle | to return for further treatment or use |
| Resource | an available supply that can be drawn upon when needed |
| Endangered species | an animal or plant nearing extinction |
| Economics | pertaining to the production, development, and management of material wealth |

2

OPTION #1

MATERIALS AND RESOURCES

Art supplies

PROCEDURE:

1. Ask the students to bring in as many empty plastic containers as they can find at home.
2. When they have them all at school, place them in a single box and ask the class how much they think the whole box is worth.
3. On the following day distribute the materials and ask them to make a toy, game, piece of art, or some other item they think they could sell to someone.
4. After they have completed their projects, arrange to have an auction or flea market for the rest of the school.
5. After they have completed the sale total up the money raised and compare it to the original value of the junk.

DISCUSSION QUESTIONS

1. Was the original material worth anything to you?
2. What made the material worth money?
3. Can you think of any other object that used to be worthless and is now worth money? (sawdust, sewage sludge, aluminum cans, pop bottles)
4. Can you think of any objects that used to be worth money and now are worthless? (textbooks, plastic wrap, styrofoam, etc.)
5. Point out that this is just one example of man making something a resource by attaching a value to it.

3

OPTION #2 - no specific materials needed

PROCEDURE:

1. Determine the local value of recycled paper. (approximately .80 to $1.25 per 100 pounds)
2. Discuss what resources are and what junk is.
3. Have the students name items that are considered junk. Keep the discussion going until someone mentions paper or a form of junk.
4. Tell the students about the value of recycled paper.
5. Have the students collect paper from their homes for one week and bring it to school. NOTE: If the amount is great, check with the principal to find an appropriate storage place.
6. Determine what the net value of the collected newspaper is.

DISCUSSION QUESTIONS

1. Why is newspaper considered a resource?
2. How is the resource of paper wasted?
3. Why do you think people do not recycle newspaper?
4. What problems are there in collecting and recycling newspapers?
5. What good things come from recycling paper?
6. Did the people you collected from place any value on the paper?
7. Would the same people have given you $1.00 for a class party?
8. What changed the junk into a resource?

TEACHER NOTE:

This option can be extended into the production and sale of paper logs. For further instructions, refer to Economics 4, Option #3.

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OPTION #3

## MATERIALS AND RESOURCES

America's Endangered Species, film, 21 minutes, available $E^2$ Office
List of endangered species, American Wildlife Federation
Posters and pamphlets, $E^2$ Office

## PROCEDURE:

1. Make a bulletin board display of endangered species information and pictures.
2. Show the film and discuss the point of the movie.
3. Ask the students what they think we are doing to preserve and protect endangered species.
4. List their answers on the blackboard and then ask them to rank them from most expensive to least expensive.
5. Have each student select an American endangered species to research.
    a. Find out what the economic reason is for the destruction of the species.
    b. Is the economic benefit a luxury or a necessity?
    c. If it is a necessity, find out if there is a less destructive replacement for the necessity.

## DISCUSSION QUESTIONS

1. Why must we build zoos and preserves for animals?
2. Why do you think we need these rare and endangered animals now?
3. Do you think animals are more valuable to us now that they are scarce?
4. Do you think one animal is more important than another, e.g. hawk or Eagle?
5. What can you do about saving endangered animals?

## REFERENCES

The Penguin: Its Life Cycle, David Thompson, Sterling Publishing Company, New York, chapter 6

The North American Alligator, Jim Pruett, Nancy McGowan, Steck-Vaughn Company, Texas

The North American Eagle, J. M. Roever, W. Roever, Steck-Vaughn Company, Texas

5

# ECONOMICS 4

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list examples of the trading of a man's time and skills at his job to the wages or income he receives.

SUBJECT AREAS:

Social Studies, Careers, Art, Mathematics

KEY WORDS:

Production cost - the cost of processing raw materials into a product

Stock - the shares of a company

Stockholder - a person holding the shares of a company

Resources - an available supply that can be drawn upon when needed

Net profit - the amount of money gained by a business

OPTION #1 - no specific materials needed

PROCEDURE:

1. Visit a local business and find out what they produce. Suggested places - bank, newspaper office, grocery store, clothing store, etc. See excursion **booklet** from $E^2$ Office, "Lake County Environmental Excursions".

DISCUSSION QUESTIONS

1. How many employees work here?
2. What type of jobs do the workers perform?
3. Would you like to work here? Why?
4. How many hours do the employees put in per week?
5. What are the physical surroundings of the workers?
6. How does the business influence the worker's life?
7. Why did the business locate in this area?
8. Is the company privately owned?
9. Where does the company obtain its raw materials?
10. Where do they sell their products?

OPTION 2

MATERIALS AND RESOURCES

Movie Projector

Filmstrips, Community Workers and Helpers, SVE

PROCEDURE:

1. Show film.
2. After the film ask the children what their fathers and mothers do when they go to work.
3. Divide the class into groups of four or five. Have each group make a mural of a town or rural area showing different occupations. Have them include the job they would like to have.

DISCUSSION QUESTIONS

1. What is an income?
2. How does a person get an income?
3. Why is an income necessary?
4. What do people do with their income?
5. How do you want to earn your income?

TEACHERS NOTES:

COMMUNITY WORKERS AND HELPERS, SVE Filmstrips

Group I

Library Workers
School workers
Doctor's office workers
Supermarket workers

Group II

Hospital workers
Department store workers
Fire department workers
Television workers

Group III

Recreation workers
Transportation workers
People who work with animals
People who make things

8

OPTION #3 - This option can be used in conjunction with Economics 3, Option #2.

MATERIALS AND RESOURCES

Paper log roller ($5-$10)
Lightweight wire that can be twisted

Optional materials: (The chemicals listed below can be purchased at a drugstore.

copper sulfate - blue flame
lithium nitrate - red flame
barium sulfate - green flame
strontium nitrate - purple flame
sodium hydroxide - yellow flame (use sparingly)
sodium chloride - yellow flame (use sparingly)

Five 5-gallon buckets
Chart I

PROCEDURE I:

1. Have the students collect newspapers for one week.
2. After determining and discussing the value of newspapers as a resource to be recycled, suggest to the students that logs could be made and sold for a profit.
3. Determine the cost of a log roller and the optional materials as well.
4. Obtain the necessary equipment and begin production. Instructions for log rolling accompany the kit.
5. Set a price on the log (50¢ - 75¢).
6. Sell the logs to parents, neighbors, and door to door.
7. Determine profit and use part of it to pay off the equipment costs.

PROCEDURE II: (Optional)

1. Establishing the company
    a. Have the students collect newspapers for one week.
    b. After determining and discussing the value of newspapers as a resource to be recycled, suggest to the students that logs could be made and sold for a profit.
    c. Determine the costs of the materials including advertising.
    d. After determining the production costs of the logs, divide the cost into small amounts.
    e. Establish a log production company and sell shares to raise money needed to begin production and purchase materials.
    f. Elect a president and treasurer for the company.
    g. Have the students decide what jobs must be done for the company. (sales, advertising, production, resource collection, etc.)
    h. Guide the company heads in assigning jobs or assign them yourself.

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2. Production
   - a. Begin production; instructions are given in the log rolling kit.
   - b. After the logs are made, soak them in a solution of one of the chemicals. Each one half cup of chemical is to be diluted in a 5-gallon container of water. Continue soaking for fifteen minutes.
3. Marketing
   - a. Have the company heads and the workers determine the price of the logs. Price is based upon cost of production. Estimate how many logs can be made and sold. Divide the cost of this amount and add on a reasonable profit. Logs should be priced from 50¢ to 75¢.
   - b. Another group of students will be assigned marketing of the logs.
4. Have another group of students make up ads for the product. Check the ads carefully.
5. Begin sales
6. Recordkeeping
   - a. Have the treasurer of the company record the income. (Chart I)
   - b. Determine a salary for each worker.
   - c. Pay expenses and salaries.
   - d. Explain the use of a graph to show the profit. (Chart II)
   - e. Help the treasurer determine the profit.
   - f. Plot the profit at regular intervals, weekly or monthly.
   - g. Determine the profit and pay out dividends.

NOTE: Little profit will be realized at first since labor and expenses must be met, but don't let this discourage the students. Save a small amount to be used at the end of the project to pay back stockholders equally for their investment.

DISCUSSION QUESTIONS

1. Is paper an important resource?
2. Why is it a resource?
3. How did the class make money?
4. What did each student have to give up to earn money?
5. How do your parents earn money?
6. Why do you want to earn money?
7. What do you do with money?
8. What do you buy?
9. Who makes the things you buy?

10

OPTION #3 con't

10. Who gets the money you pay for something?

11. Where did the money you received come from?

OPTIONAL QUESTIONS

12. How do you determine the production cost?

13. Why sell stocks?

14. Why was a president and treasurer elected?

15. Why were the jobs divided up?

16. Why were the workers paid?

17. Did all the stockholders work?

18. Why were all stockholders paid?

19. How was a market determined?

20. Why did production costs have to be known before a price was set?

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## BALANCE SHEET

| Date | Costs | covered by sale of stock | operating cost |
|---|---|---|---|
| | Machine | | |
| | Five chemicals | | |
| | Buckets | | |
| | Paper for advertising | | |
| | Wire | | |
| | Chemicals | | |
| | Wire | | |
| | Paper | | |
| | TO | | |

| Date | Sales |
|---|---|
| | TOTAL |

OPTION #3

CHART 1

12

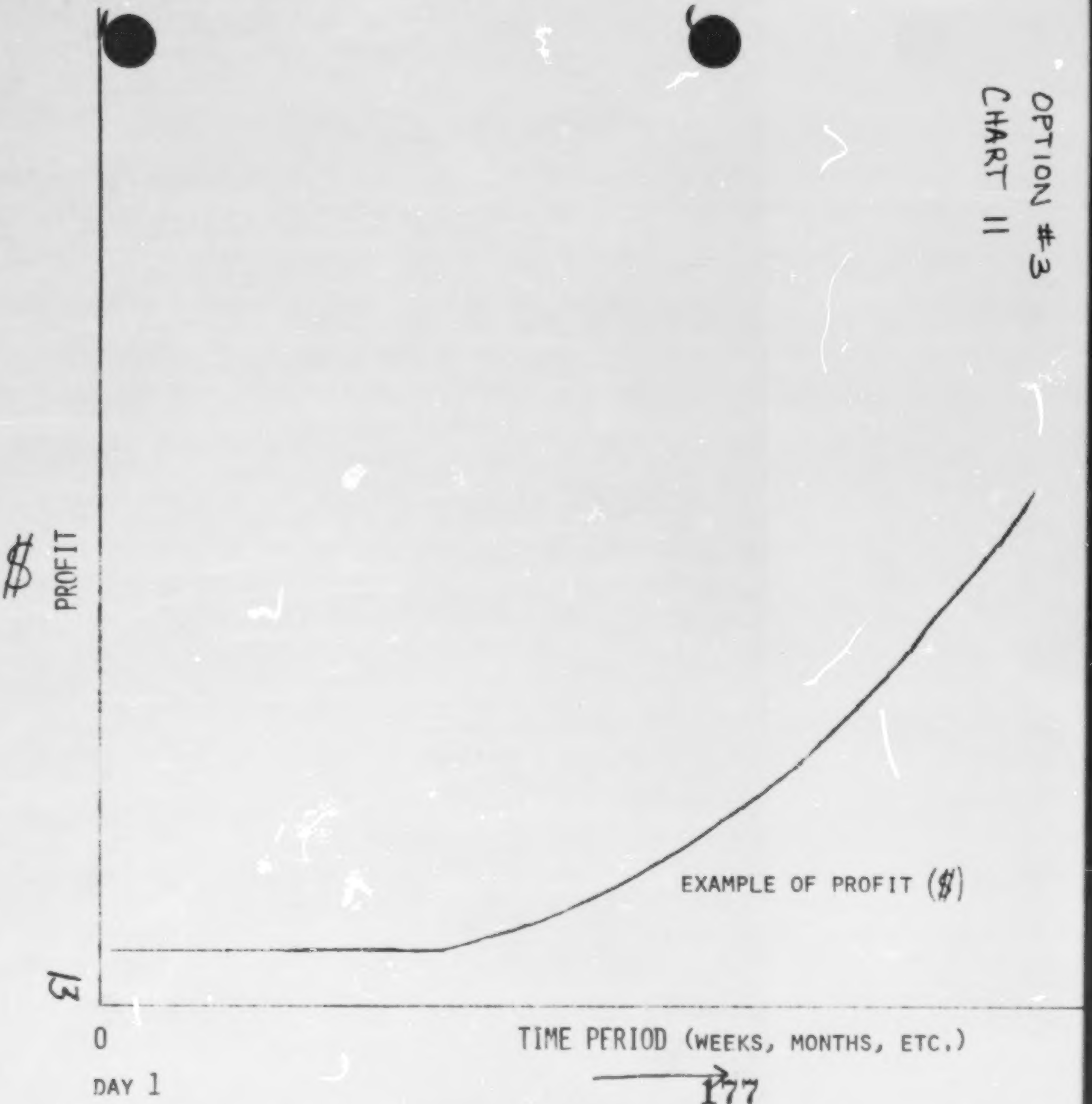
OPTION #3

CHART II

# ECONOMICS 5

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to demonstrate how demand affects the cost of a product.

## SUBJECT AREAS:

Social Studies, Mathematics

OPTION #1

MATERIALS AND RESOURCES

Play money or script

PROCEDURE:

1. Set up a reward for students to earn a certain amount of script for work done in class. Be certain they feel the tasks are easy to accomplish. Make certain the students have something to buy with their script.
2. After two weeks of working under that system, explain that you will only give rewards to the five best projects each week.
3. After two more weeks under this system, announce you will only give credit to the two best projects each week.
4. At the end of the week discuss the following questions.

DISCUSSION QUESTIONS

1. Did any of you feel pressured to work hard in any of the weeks? Which one?
2. Why did you work harder in one week than the other?
3. Did you feel your work was better the second or third week?
4. Did the supply of rewards decrease each week? Explain.
5. Did the demand for rewards increase each week? Explain.
6. Can you think of any examples of materials that became more expensive as demand increased?

OPTION #2

## MATERIALS AND RESOURCES

Play money
Tokens to auction off (the number in the class times five less twelve)

## PROCEDURE:

1. Appoint an auctioneer and a token banker to handle the tokens.
2. Tell the students that the tokens are valuable and they should be sure to purchase a supply for their use. There should be one token per student.
3. After the first round reduce the number of tokens by three; also after each subsequent round.
4. After the second round tell them they need five tokens for a special privilege. Have the auctioneer announce how many are up for auction.
5. Conduct five rounds and observe their behavior.
6. Review discussion questions.

## DISCUSSION QUESTIONS

1. Who paid the most for their five chips? The least? Why the difference?
2. What products can you name that have had similar effects on their price?
3. What do you think causes these effects?
4. Do any items decrease in price as demand goes up?

   CAUTION: Better technology reduces the price of high volume items like calculators, but quality may not be the same.

OPTION #3

MATERIALS AND RESOURCES

Economics for Primaries, QED, #1 - The Toy Store

PROCEDURE:

1. Show the filmstrip.

DISCUSSION QUESTIONS:

1. If you were Bob or Ray, what would you do? Why?
2. Tell about a time when you had a similar problem. How did you solve it?
3. How many possible solutions to the boys' problems can you think of?
4. If they spent the money they did have, what would they have to give up?
5. If they saved their money until they had enough to buy the good yo-yos, what would they have to give up?
6. Do you think it is always better to buy something that lasts a long time?
7. What things can you name that you wanted at one time, but don't want any more? Why don't you want them now?
8. If Bob and Ray put their money together and bought one toy, to whom would it belong?
9. What things do you share with someone else?
10. What things do you have that belong to you alone?
11. How is having a friend different from having a toy? How do you make friends? How do you get toys?
12. Some people provide us with services. They help protect us or give us assistance in some fashion. Who in the filmstrip does these things?
13. Why are there different prices for yo-yos?
14. What would happen if no one wanted to buy the yo-yos?
15. Why are items put on "clearance"?

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list tactics used to sell products.

SUBJECT AREAS:

English, Social Studies, Art

KEY IDEAS:

Tactics in advertising

1. Endorsement by famous people (real or fictional)
2. Stage setting by use of pictures
3. Vague statements that seem desirable
4. Instructions
    a. Go out right now and buy .....
    b. Ask mom to buy .....
5. Peer group identification

## OPTION #1

### MATERIALS AND RESOURCES

Paper and pencil
Crayons

### PROCEDURE:

1. Pick a product that you are familiar with and make an advertisement for that product.
2. Make the ad humorous, attractive, and effective.
3. Make the ad convince the "public" that the product is necessary.
4. Have the class select the five best ads from the group using the following points:

   Use of humor
   Artistic quality
   Clarity

### DISCUSSION QUESTIONS

1. How can an original idea develop into a commercial product?
2. Where can companies advertise their products?
3. What type of advertising seems to be used by most of the local businesses?
4. What kinds of things did you do to get people interested in your product?

OPTION #2 - Begin this option on a Friday.

MATERIALS AND RESOURCES

| | |
|---|---|
| Television guide<br>Home television set<br>Chart I | Videotape or slides of commercials ($E^2$ Office) |

PROCEDURE:

1. Distribute Chart I.
2. Explain how advertisements are used to motivate people to purchase items.
3. Explain the different tactics listed on the chart.
4. Ask the students if they can recall of any instances where they saw these different tactics used.
5. Have the students watch one hour of a Saturday morning television cartoon show.
6. While they are watching the show, have them fill out the chart.
7. On Monday have them bring in the charts and compare them.

DISCUSSION QUESTIONS

1. Did you want any of the products? Which ones? Why?
2. Are the commercials telling the truth about the product?
3. What don't you like about the commercials?
4. Do you really need any of the products?
5. Does the ad make you feel you need the product?
6. Should you always do what the ad says? Why or why not?

REFERENCES FOR THE TEACHER

Coping With Television; Joseph Littell, McDougal, Littell, and Company, Evanston, Illinois, 1973, p. 163-189.

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OPTION #2 CHART I

TIME: ________ TO ________ CHANNEL ________

HOW MANY COMMERCIALS WERE THERE? __________

HOW OFTEN WERE THE INDIVIDUAL TACTICS USED?

1. WELL KNOWN PEOPLE USING THE PRODUCT ____________________

2. DOES THE AD DEPICT A SPECIAL SCENE TO MAKE THE PRODUCT APPEALING?

   ____________________________

3. THE AD SEEMS TO PROMISE THAT GOOD THINGS WILL HAPPEN IF YOU USE THE PRODUCT. ____________________

4. HOW OFTEN ARE KIDS YOUR OWN AGE USED IN COMMERCIALS? __________

5. INSTRUCTIONS GIVEN (TELL MOM TO BUY.....) ____________________

## TACTICS IN ADVERTISING

1. ENDORSEMENT BY FAMOUS PEOPLE (REAL OR FICTIONAL)
2. STAGE SETTING BY USE OF PICTURES
3. VAGUE STATEMENTS THAT SEEM DESIRABLE
4. INSTRUCTIONS
   A. GO OUT RIGHT NOW AND BUY....
   B. ASK MOM TO BUY....
5. USE OF KIDS YOUR OWN AGE

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## OPTION #3

### MATERIALS AND RESOURCES

Magazines, Sunday supplements, etc

### PROCEDURE:

1. Explain how advertisements are used to motivate people to purchase products.
2. Explain what the different tactics are for advertisements. Refer to Chart I.
3. Discuss the difference between luxuries and necessities.
4. Have the students select an ad which examplifies each particular tactic. In addition have them find an ad that does not use any of the tactics.
5. Have each student present his collection of ads and explain them.
6. Have the class analyze each ad that is said not to use advertising tactics in order to see if this is truly the case.
7. Have the class decide the following:
    a. Is each item advertised really a luxury or a necessity?
    b. Is each item presented as a luxury or a necessity?

### DISCUSSION QUESTIONS

1. Would you want to buy any of these items? Why or why not?
2. Are the ads telling the truth about the product?
3. What don't you like about the ads?

### TEACHER'S NOTE:

This unit can be used in conjunction with Technology 8, Option #3.

# ECOSYSTEMS

GRADES

## ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34
TITLE IVC ESEA

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Synopsis

Ecosystems 5: At the completion of this unit the student will be able to compare the size of the earth to our universe.

Option 1 - Students view the film, "Cosmic Zoom", and discuss the size relationship of man to the universe. ... 3
Option 2 - Students participate in an exercise to sizing our solar system. 4
Option 3 - Students see a filmstrip showing the comparison of man to the universe. ... 5

Ecosystems 6: At the completion of this unit the student will be able to explain how plants capture sunlight and use it to help them to make the food and oxygen that people and other animals need in order to live.

Option 1 - Students review their lunch and trace their food back to the Sun. ... 7
Option 2 - Students grow beans and compare them to plants grown in darkness. ... 9
Option 3 - Students construct and observe the action in an aquarium and on the school grounds. ... 10

Ecosystems 7: At the completion of this unit the student will be able to explain that an ecosystem consists of many organisms interacting in a complex relationship between living and non-living parts.

Option 1 - Students explore their school ecosystem to see how the school grounds ecosystems fit together. ... 12
Option 2 - Students view a filmstrip/cassette and discuss how things in their world fit together. ... 14
Option 3 - Students are lead by the teacher through an inquiry about the interrelatedness of ecosystem parts. ... 15

Ecosystems 8: At the completion of this unit the student will be able to explain how the constant change in ecosystems is due to the interaction of the many plants and animals with their non-living environment as evidenced by the many cycles in our ecosystem (carbon, food, or water cycles).

Option 1 - Students play a game which tests their ability to identify parts of ecosystems. ... 17
Option 2 - Students study a filmstrip on changes and then apply them in the outdoors. ... 18
Option 3 - Students study and compare three micro-ecosystems in a changing situation. ... 19

## Table of Contents

Ecosystems 9: At the completion of this unit the student will be able to collect information about the undesirable accumulation of a substance in the environment - pollution - and plan a means of solving the problem.

Option 1 - Students monitor the litter on the school site and attempt to stop it. .... 22

Option 2 - Students make a photo essay of community pollution and ask the mayor for solutions and then act on a problem. .... 24

Option 3 - Students identify pollution problems and attempt to find resource people to help them solve them. .... 26

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## EXPLANATION OF CONCEPT AREA

ECOSYSTEMS - In any program of environmental education we must include material to help students develop a clearer understanding of basic ecological principles.

We begin this process by defining the basic components of a simple system, its energy source, definition, and basic relationships.

We then build upon this to define place, energy, interactions, and the problems of pollution of ecosystems.

In grades 6-8 we focus on the complexity of ecosystems, energy forms and transfer in ecosystems, and the stress capacity of ecosystems.

In high school the students use their previous experiences to further explore the structure of ecosystems, their dynamic nature, and the interactions between humans and ecosystems.

# ECOSYSTEMS 5

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to compare the size of the Earth to our universe.

SUBJECT AREAS:

Science

2

## OPTION #1

### MATERIALS AND RESOURCES

Cosmic Zoom, 16 mm film, available $E^2$ Office

### PROCEDURE:

1. Show the film in two sections with a break at the point when the camera zooms back to the boy in the boat.
2. At this point discuss the scenes viewed as to the scale of man in the universe we know.
3. Now show the second half of the film.
4. Discuss the size of man in comparison to both extremes of the film.

### DISCUSSION QUESTIONS

1. What is the universe?
2. What is the smallest thing you know?
3. What is the largest thing you know?

3

OPTION #2

## MATERIALS AND RESOURCES

Adding machine tape of solar system, available $E^2$ Office

## PROCEDURE:

1. Have the students represent each of the different planets in our solar system. If you can do it also select them according to the diameter of the planets corresponding relative to student size. (See table below.)
2. When everyone is lined up on the points on the tape give the children time to observe the spacing.
3. Discuss the following points:
   a. Where is the Earth?
   b. Is it biggest or smallest?
   c. How many other planets are there?
   d. What is our universe?
   e. What part of the universe are you?

| PLANET | Average Distance from SUN | | DIAMETER |
|---|---|---|---|
| | kilometers (millions) | A.U.* | kilometers (thousands) |
| Mercury | 57.9 | .39 | 4.8 |
| Venus | 108 | .72 | 12.2 |
| Earth | 150 | 1.00 | 12.7 |
| Mars | 228 | 1.50 | 6.8 |
| Jupiter | 779 | 5.2 | 142.0 |
| Saturn | 1426 | 9.50 | 121.0 |
| Uranus | 2870 | 19.2 | 47.0 |
| Neptune | 4493 | 30.1 | 44.5 |
| Pluto | 5898 | 39.5 | 12.7 (?) |
| Moon | 93 | 1.0 | - |

* Astronomical Units: The distance from the earth to the sun is defined as 1 A.U.

Above chart taken from Earth Science: Patterns in Our Environment, Bisque, Pratt, and Thompson, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1975, p. 264.

4

## OPTION #3

### MATERIALS AND RESOURCES

Spaceship Earth - The Universe, FS/C, available $E^2$ Office

### PROCEDURE:

1. Show the filmstrip. CAUTION: Some of the content of the filmstrip is difficult but if you select the right sections or tell the students to pay attention at certain points it provides a unique experience.

2. After the filmstrip ask the students to write about what they think our universe is.

### DISCUSSION QUESTIONS

1. Pursue the idea of scale in relationship to known objects. (If the Earth was a ½ marble, Mars would be 85 yards away, almost a football field.)

2. Maybe the students could make a model of each planet to fit on the tape for option #2.

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to explain how plants capture sunlight and use it to help them to make the food and oxygen that people and other animals need in order to live.

SUBJECT AREAS:

Science, English

6

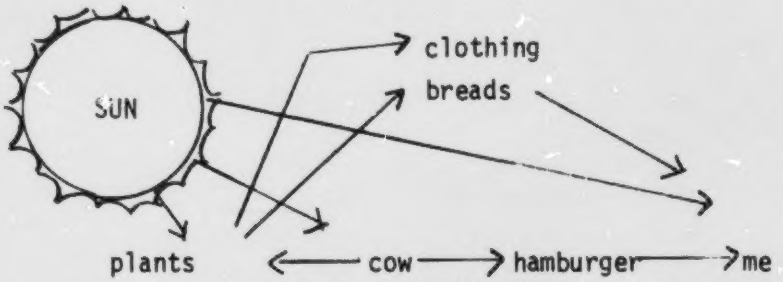
OPTION #1

MATERIALS AND RESOURCES

Paper, pencils, and crayons

PROCEDURE:

1. Have the children draw the food they ate for lunch on the tray ditto.
2. On the blackboard print a lunch menu and draw the following diagram:



3. List some of the suggestions the children drew. Examples: roast beef, chicken, pork chops, etc.
4. Point out how each food can be linked back to the plants and then to the sun's light.

DISCUSSION QUESTIONS

1. Think of your favorite food. Where does it come from?
2. What do animals eat? (almost always some form of plant)
3. Where do plants get the light they need?
4. Where do plants get the water they need?
5. Why do we need the sun's energy in order to get a hamburger?
6. Where do plants get the food (minerals) they need to grow?

7

OPTION #1

8

## OPTION #2

### MATERIALS AND RESOURCES

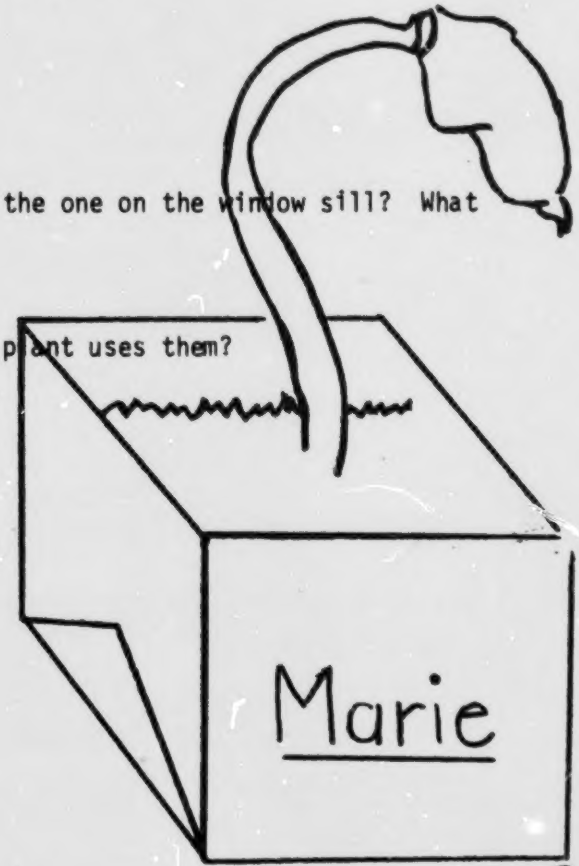
Bean seeds and empty ½ pint milk cartons for an entire class
Potting soil
Large tray

### PROCEDURE:

1. Four days before the students plant their beans, start two cartons of bean seeds. After they begin to grow, place one in a closet and put the other on the window ledge.
2. Prepare bean seed cartons.
   a. Poke a hole in the bottom of the carton for drainage.
   b. Fill the carton with soil covering the seed lightly.
   c. Label the carton with each child's name.
3. Place a tray under all the cartons.
4. Each student will be responsible for watering his plant once or twice a week.
5. Each day measure the growth of all the plants.

### DISCUSSION QUESTIONS

1. How much did your plant grow?
2. Why do you think it grew taller?
3. Did the plant in the closet grow like the one on the window sill? What was the difference?
4. What things do seeds need to grow?
5. What happens to those things when the plant uses them?



## OPTION #3

### MATERIALS AND RESOURCES

Two covered one-gallon jars of distilled water that have set over the weekend
½ gallon of pond water
Microscope
Board approximately 10"x12"
Access to an outdoor area
A few plants
A frog or a toad

### PROCEDURE:

1. Set up two terrariums.
    a. Place one half the pond water in each gallon jar.
    b. Add a few plants and a frog or a toad.
    c. Cover and place one jar in the sun and one in the dark.
2. View the animals and plants in this water in about two weeks.
3. Observe plant life out of doors. How do they get sunlight?
4. Compare leaf sizes of plants in bright sunlight with those in the shade?
5. Place a board across an area of grass and leave it undisturbed for about a week. Have students observe the grass at the beginning and end points.
6. Cover a portion of the plant life in the terrarium in the sun. Observe the plants from day to day.

### DISCUSSION QUESTIONS

1. What happened to the grass that was covered?
2. What happened to the pond water in darkness?
3. What happened to the plants that were covered?
4. Why were the plants that were uncovered able to grow?
5. What happened to the animal?
6. Why do you think it was able to live when the plants died?
7. What did the plants give to the animal?

10

# ECOSYSTEMS 7

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to explain that an ecosystem consists of many organisms interacting in a complex relationship between living and non-living parts.

SUBJECT AREAS:

Science

11

OPTION #1 - spring or fall

## MATERIALS AND RESOURCES

School map
Magnifying glasses
Stiff cardboard
Discovery chart
Binoculars, if available

## PROCEDURE:

1. Divide the class into small exploring parties. Go outdoors and have each group explore its own area.
2. Look for animals such as mice, squirrels, dogs, cats, rabbits, chipmunks, birds, or reptiles.
3. Note plant matter such as grasses, wildflowers, shrubs, trees, leaves, or seeds.
4. Also look for non-living matter such as soil, rocks, water, metals, or plastics.
5. Prepare the Discovery Chart and distribute it to one recorder for each group.

## DISCUSSION QUESTIONS

1. How does each object you described fit into the area you studied?
2. What might happen to the animals if fertilizer was put on the lawn? What would happen if poisons were used?
3. What do the small animals need for survival?
4. What do the plants need for survival?
5. What makes up the soil?
6. What happens to a dead plant or animal?
7. Fill out the chart. How and why do these objects interact?
8. Where do you fit into the diagram?
9. Is there any object that does not interact? Why?

12

OPTION #1 DISCOVERY CHART TEAM # ______

DRAW OR DESCRIBE:

| | | |
|---|---|---|
| SMALLEST | BIGGEST | ROUNDEST |
| HARDEST | DULLEST | BRIGHTEST |
| SOFTEST | MOST COLORFUL | |
| | | |

OPTION #2

MATERIALS AND RESOURCES

Filmstrip/cassette, Part 1, "This Earth Everything Fits Together"

PROCEDURE:

1. Follow the directions in the teacher's manual, page 11. It is very detailed and includes questions for discussion.
2. When you have finished the filmstrip/cassette, begin a bulletin board with a picture of a child in the center. The students should be told to bring in pictures of things related and tied to each other.
3. When they place a picture on the bulletin board, discuss the relationship of all the items on the board.

## OPTION #3

### MATERIALS AND RESOURCES

Life in a Terrarium, Life in a Pond, Animal Homes, filmstrips from Inquiry Audio-Visual

### PROCEDURE:

1. Show any or all of the filmstrips to the class with emphasis on the role of living and non-living parts.
2. Have each student draw a food/life web for the filmstrip.
3. Their drawings should show how different parts need each other by arrows or lines.

### DISCUSSION QUESTIONS

1. What things do the different things in our ecosystem need?
2. Are there many things in your pond (lake) food web or just a couple?
3. How do we need non-living parts, rocks, soil, dead trees?
4. Is there anything in our ecosystem that is not used or that goes to waste?

## ECOSYSTEMS 8

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to explain how the constant change in ecosystems is due to the interaction of the many plants and animals with their non-living environment as evidenced by the many cycles in our ecosystem (carbon, food, or water cycles).

SUBJECT AREAS:

Science

OPTION #1

MATERIALS AND RESOURCES

Resource books list
Study prints list

PROCEDURE:

1. Review the meaning of the word ecosystem.

2. Place a statement on the board daily concerning the changing nature of ecosystems. Example: Spiders eat insects.

3. The children are to read the statement and try to prove it to be true or false.

4. If you as the teacher trick the students, you win. If the students catch the false statement and prove it to be one, they win.

Here is a list of sample statements:

a. Spiders are meat eaters.

b. Honey bees are not needed in a garden.

c. Ants live in colonies.

d. If it does not rain, plants will die.

e. Trees die every winter.

f. If all plants died, man could still live on meat.

g. Plants get their food from the sun.

h. Rocks, wind, and water make an ecosystem.

i. Worms are needed for plants to grow.

j. Frogs, toads, and snakes are amphibians.

DISCUSSION QUESTIONS

These questions should be used after all ten statements have been proven right or wrong.

1. What changes were discovered in each true statement?

2. What statements talked about interactions?

3. Which statements talk about ecosystems?

4. What is another name for a meat eater?

5. What is another name for a plant eater?

17

OPTION #2 - three separate sessions totaling one and one half hours

## MATERIALS AND RESOURCES

Filmstrip, "Life in a Pond", available $E^2$ Office
Filmstrip, "From Rock to Forest", available $E^2$ Office

## PROCEDURE:

1. Show and discuss one or both of the filmstrips. Key on the concepts of change and interaction.
2. Take the children to a place where water is standing and let them observe life that is present in it during a dry spell. Students should be noting the following:
   a. What kinds of plant life are present?
   b. How thick and high is this plant life?
   c. How deep is the water?
   d. What animals or signs of animals are present?
   e. What does the area feel like when you walk on it?
3. Take another trip to the same place. This trip should be made after a rainy spell. Keep in mind the same questions.

## DISCUSSION QUESTIONS

1. What is an ecosystem?
2. Did you see an ecosystem at the area?
3. Was there any change in the area from the first to the second trip?
4. What changes did you see? Why?
5. Will it change again?

## OPTION #3

### MATERIALS AND RESOURCES

Three (3) gallon size glass jars (more if you like)
Algae or seaweed
Pond water
Fertilizer made by Ortho
Copper sulfate

### PROCEDURE:

1. Add pond water and algae to all three jars.
2. Mark the jars #1, #2, and #3.
3. Place all jars on a window sill for two weeks before adding chemicals.
4. Add copper sulfate to jar #2. (¼ teaspoon)
5. Add fertilizer to jar #3. (¼ teaspoon)
6. Have students observe the jars daily and record their observations on the chart.

### DISCUSSION QUESTIONS

1. What happened to each jar?
2. In which jar did you see the most change?
3. What caused this change to happen?
4. Was this change caused by a living or non-living part of the environment? Explain.

OPTION #3

## OBSERVATION CHART

| DATE | JAR 1 | JAR 2 | JAR 3 |
|---|---|---|---|
| DAY 1 | | | |
| DAY 8 | | | |
| DAY 12 | | | |
| | | ADD CHEMICALS | |
| DAY 15 | | | |
| DAY 17 | | | |
| DAY 19 | | | |
| DAY 21 | | | |
| DAY 23 | | | |
| DAY 25 | | | |
| DAY 27 | | | |
| DAY 29 | | | |

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to collect information about an undesirable accumulation of a substance in the environment - pollution - and plan a means of solving the problem.

SUBJECT AREAS:

Language Arts, Science, Social Studies, Mathematics

## OPTION #1

### MATERIALS AND RESOURCES

Waste cans or plastic bags for collecting litter
Problem-solving Form A

### PROCEDURE:

This option focuses on the immediate area of the school or the classroom and what students can do to solve the problem.

1. At a time when there is a lot of litter in and around the school grounds, take the class on a clean-up walk. Use waste cans or plastic bags and pick up every piece of litter. Have one or two students record on a map the worst places for litter.
2. For later use it would be helpful to collect the litter from different areas in different bags, i.e. bag A - front lawn, bag B - halls on the second floor, etc.
3. When they have collected all the litter, determine the worse littering area(s).
4. Tell the class it is their task to reduce the amount of litter by fifty percent in the next two weeks.
5. Give them Form A and have them fill it out about the litter problem.
6. Encourage them to avoid clean-up days and apply some science and language skills to the problem. Point out the KEEP AMERICA BEAUTIFUL campaign, PITCH-IN, large numbers of litter barrels at shopping areas, and educational appeals. Can they determine the distance people will walk to put litter in a can?

### DISCUSSION QUESTIONS

1. Is there one best way to stop pollution?
2. Is pollution a matter of education?
3. How can we be certain of solving environmental problems with maximum effectiveness?
4. What is the role of the individual in solving problems?
5. On Form A, what is the most important step? Why?
6. Who is responsible for solving problems that affect many different groups of people?
7. Is litter a symptom of our general attitude about others and the environment?

# PROBLEM-SOLVING FORM A

PROBLEM (DEFINE VERY CLEARLY) ______________________________

______________________________________________________

FACTS ABOUT THE PROBLEM ______________________________

______________________________________________________

POTENTIAL SOLUTIONS ______________________________

______________________________________________________

BEST SOLUTION ______________________________

______________________________________________________

PLAN OF ACTION ______________________________

______________________________________________________

DATE OF ACTION AND RESOURCE(S) NEEDED ______________________________

______________________________________________________

## OPTION #2

### MATERIALS AND RESOURCES

Polaroid cameras and film
Posterboard
Magic markers
Glue
Photo Report handout

### PROCEDURE:

1. Tell the students they are going to make a photo display to explain to the city fathers the pollution problems in the area.
2. Assign each group of four or five students a section of the town to photograph.
3. Give each group a photo report handout to read.
4. Go over the handout in class and explain how to use the cameras.
5. Attempt to have one adult drive each group to their area to photograph the pollution.
6. When each group is finished collect and categorize all of the good photos.
7. Arrange them on a map of the community and help each group write a narrative
8. Invite in the mayor so that the students can explain the posters.
9. When the mayor is there, ask him for some solutions to the problem(s).
10. Record these and when he has left have the students select one or two problems to work on.
11. Assist them in the problem-solving.

### DISCUSSION QUESTIONS

1. Did you think there were that many problems in our town?
2. Can you show pollution with pictures? Explain!
3. What makes something pollution?
4. What can we do about pollution?
5. Do you ever pollute? Explain.
6. What can you do about your pollution? Will you?
7. Can the mayor solve more problems than you can? Explain!
8. Will your parents help us stop pollution?

# HOW TO PLAN YOUR PHOTO REPORT

## YOUR TOPIC

The number of photographs and the amount of copy should be sufficient to tell your story completely, yet as concisely as possible.

## RESEARCH

The more complex your subject, the more research you will want to do. If your report lacks good research, it may be superficial and even inaccurate.

An easy and efficient way to record the facts and details you accumulate while doing research is simply to record each fact on a separate index card.

## ORGANIZATION

Begin by sorting your index cards according to subject matter.

Arrange the cards in a logical or chronological sequence.

While establishing a sequence, think about the photos you will need.

You may want to plan more photos to eliminate as much copy as possible.

Be certain you are satisfied with your organization before proceeding to the next step.

## PHOTOGRAPHS

On the index card for each picture you plan to take, make a rough sketch of what you want the picture to show.

Opportunities for additional pictures may present themselves on location. You may, of course, shoot these pictures in addition to those called for on your storyboard.

There is always the possibility that unexpected events will provide highlights and human interest elements for your report.

## CAPTIONS AND NARRATIONS

Keep your captions as brief as possible and include them only when the photos do not tell the whole story. Naturally, captions should be typed, not handwritten.

You may want to accompany the picture with some narration, and possibly, background music.

Since timing is very important, make sure you know exactly where to begin and end each part of your narration as well as any background music you may want to include.

Taken from Photo Reports Make It Happen, Kodak Customer Service Pamphlet, Rochester, New York.

## OPTION #3

### MATERIALS AND RESOURCES

Polaroid cameras and film
Posterboard and magic markers
Problem-solving Form A
How to Plan Your Photo Report

### PROCEDURE:

1. Discuss various types of pollution, focusing on land pollution. Students shall be told to look for land pollution problems on the way to and from school.

2. Student groups shall select a pollution problem and seek resource people to see how these problems can be solved. Using Form A to define the problem, encourage them to photograph and prepare display about the particular problem.

| Suggested land pollution problems | Possible resource(s) |
|---|---|
| Abandoned autos | Police |
| Litter (paper, glass, cans) | Sanitation Department |
| Residential garbage | Local trash pick-up |
| Junkyards | Junkyard dealer |
| Abandoned homes | City government |
| Gravel pits | Soil and water conservatio |

3. Students should work on their topic in groups and find solutions to the problem that will help complete Form A.

4. Each group will then report to the class the findings on how the problem they chose can best be solved.

5. From this the class will select the best problem and solution to be tackled by the class.

6. Students and teachers will then organize to put their plan into action to resolve the problem.

### DISCUSSION QUESTIONS

1. Is there one best way to stop pollution?

2. Is pollution a matter of education?

3. How can we be certain of solving environmental problems with maximum effectiveness?

4. What is the role of the individual in solving problems?

5. On Form A, what is the most important step? Why?

6. Who is responsible for solving problems that affect many different groups of people?

## PROBLEM-SOLVING FORM A

PROBLEM (DEFINE VERY CLEARLY) ______________________________

______________________________________________

FACTS ABOUT THE PROBLEM ______________________________

______________________________________________

POTENTIAL SOLUTIONS ______________________________

______________________________________________

BEST SOLUTION ______________________________

______________________________________________

PLAN OF ACTION ______________________________

______________________________________________

DATE OF ACTION AND RESOURCE(S) NEEDED ______________________________

______________________________________________

# HOW TO PLAN YOUR PHOTO REPORT

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The number of photographs and the amount of copy should be sufficient to tell your story completely, yet as concisely as possible.

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## PHOTOGRAPHS

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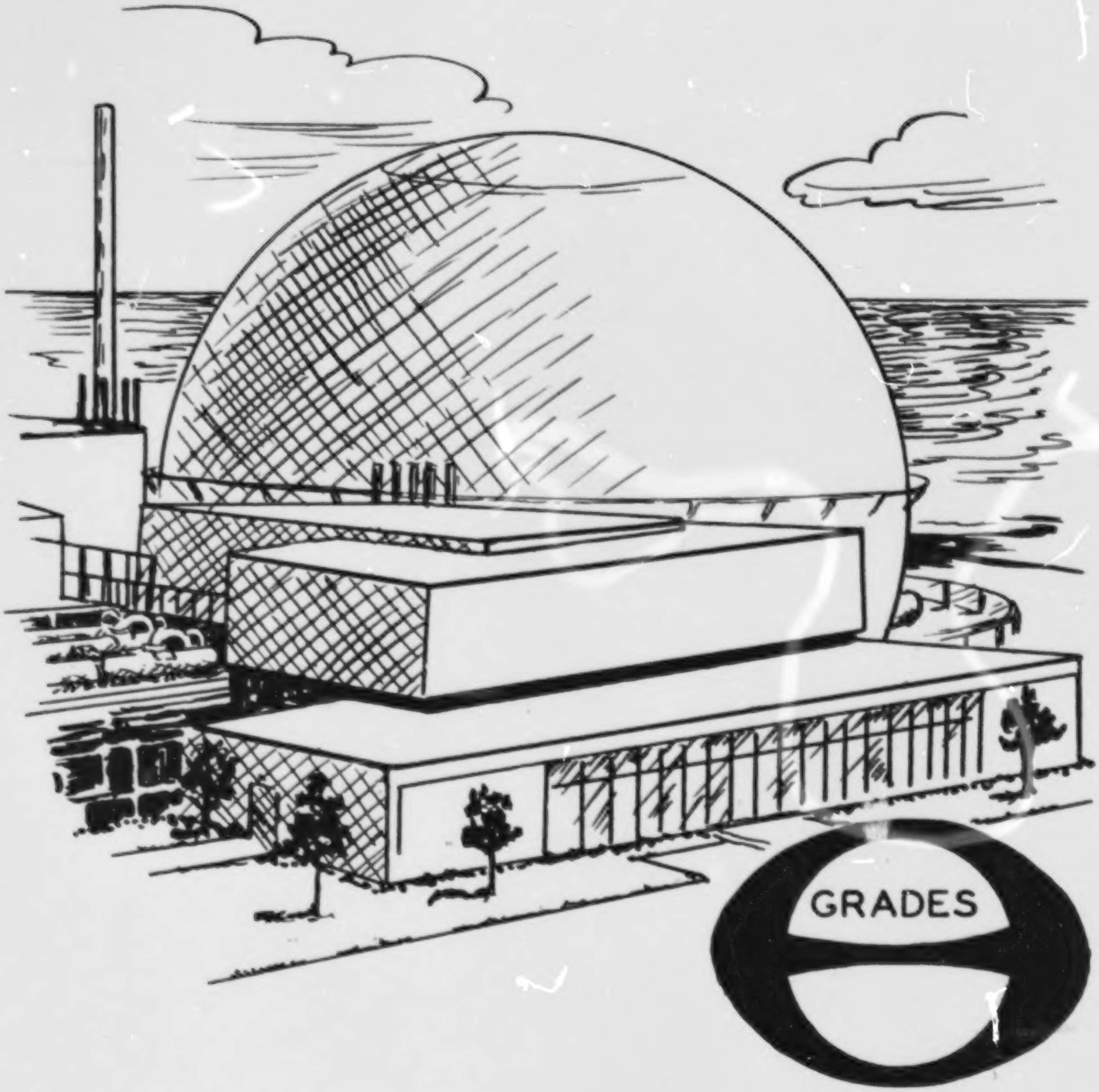
Since timing is very important, make sure you know exactly where to begin and end each part of your narration as well as any background music you may want to include.

Taken from Photo Reports Make It Happen, Kodak Customer Service Pamphlet, Rocheste[illegible] New York.

# ENERGY



GRADES 8

# ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34

TITLE IVC ESEA

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Energy 5, Option 3 - Winter ............................................ 15

Synopsis

Energy 3: At the completion of this unit the student will be able to define and diagram the link of the sun to food.

Option 1 - Students grow plants to study how sunlight is turned into energy. .. 3
Option 2 - The film, Green Plants and Sunlight, is used to illustrate how plants produce food. .. 4
Option 3 - Students analyze their diet to determine that the sun is the ultimate source of their own energy. .. 5

Energy 4: At the completion of this unit the student will be able to list new ways man uses energy that were brought about by man's need for energy.

Option 1 - Students make sketches of ancient and modern energy uses to see how needs have changed. .. 8
Option 2 - A fieldtrip to a museum and an energy booklet are used to point out man's changing need for energy. .. 9
Option 3 - Dioramas are used to show how different situations require different uses of energy. .. 10

Energy 5: At the completion of this unit the student will be able to list five forms of energy.

Option 1 - Students observe energy use in nature and in man-made communities to identify the five forms of energy. .. 12
Option 2 - Students visit a bog to discover forms of energy related to fossil fuels. .. 13
Option 3 - Students creatively brainstorm early man's use of energy and compare it with modern man. .. 15

Energy 6: At the completion of this unit the student will be able to list the effects on the environment of converting energy to meet man's needs.

Option 1 - Students hear a lecture on nuclear power plants in order to identify their effect on the environment. .. 17
Option 2 - Ecology posters are used to stimulate a discussion of the causes of environmental problems. .. 18
Option 3 - A candle is burned to illustrate the effect of fossil fuel conversion on the environment. .. 19

## EXPLANATION OF CONCEPT AREA

ENERGY - The need for students to understand more about the concept of energy is obvious with all the controversy in recent months.

In dealing with energy, we begin with merely identifying the Sun as the primary source and establishing our need for energy.

We then help the student to discover the ways energy is used by organisms, including man. This is then built upon to identify the various forms of stored energy and the conversions necessary for effective use of energy.

In the junior high we discuss the effect of culture in determining energy needs. Students then explore the ways we lose energy, the scope of the problem, and future needs and forms of energy.

In high school we explore the various aspects of energy in depth. This deals with usage in the United States and in the World, and the various transformations necessary to make energy readily available. Along with the transformations and technology, we explore the problems to be faced and the potential for solving these problems in a manner which will have minimal environmental impact.

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to define and diagram the link of the Sun to food.

## SUBJECT AREAS:

Science

2

OPTION #1 - This unit should be started in early fall and include three weeks of observation for germination and occasional observation and maintenance periods throughout the school year.

MATERIALS AND RESOURCES

Soybeans or peanuts
Large glass jar
Milk cartons
Charcoal (optional)
Rocks
Sand
Topsoil

PROCEDURE:

1. Each child will plant two seeds in a milk carton filled with soil. Make certain the milk carton has a hole in the bottom for drainage.

2. At the same time place 8-20 seeds in a roll of damp paper toweling. Stand this roll on end and place in a jar with three inches of water.

    a. Let these seeds stand until the other seeds have sent up shoots.
    b. Remove them from the towel and examine them.
    c. Try to explain their source of energy.

3. Each child will be responsible for regularly watering their carton.

4. Cover one seedling with a can, box, or black paper to block sunlight. Keep the rest in sunlight.

5. Discuss what things plants need to grow and compare those in darkness and in sunlight.

6. If using peanuts, watch for blossoms. Then cover with soil to cause the development of peanuts.

7. While the seeds are sprouting, bring in some peanuts to burn. Place the whole peanut on a pin stuck in a cork. Light the peanut and see how long it burns. Time the burning time for several peanuts.

DISCUSSION QUESTIONS

1. How does it burn?

2. What was it that burned?

3. What is the relationship between food and energy?

4. Where does energy come from?

OPTION #2

MATERIALS AND RESOURCES

Film, Green Plants and Sunlight, Northern Lake County Film Co-op

PROCEDURE:

1. Show the film and follow with discussion questions.
2. Have the students draw an energy chain . If necessary, make only one chain on the blackboard.
3. You should try to show the importance of the Sun for energy.
4. Make the chains simple, e.g. Sun, grass, cow, man

DISCUSSION QUESTIONS

1. What is the relationship between plants and sunlight?
2. What does the plant get from the sun?
3. What does the plant do with the energy?
4. How is this food used?

4

OPTION #3

MATERIALS AND RESOURCES

Food chart
Bulletin board
String

PROCEDURE:

1. Give each student a blank food chart.
2. Discuss the examples and explain that they should record all the food they eat for one day under the proper meal.
3. They should then identify the steps between them and the sun.
4. Discuss the various foods and the steps.
5. Construct a sun power chart on a bulletin board.

DISCUSSION QUESTIONS

1. Do we need the Sun? Explain.
2. Do any of our foods grow without sunlight? Explain.
3. How do we know we need sunlight?
4. Do plants that don't need sunlight help us, for example, mushrooms?

OPTION #3

## FOOD CHART

| | | | | |
|---|---|---|---|---|
| BREAKFAST: | | | | |
| 1. SAUSAGE ← | PIG ← | CORN ← | SUN | EXAMPLE |
| 2. EGGS ← | CHICKEN ← | GRAINS ← | SUN | EXAMPLE |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| LUNCH: | | | | |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| DINNER: | | | | |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |

6

# ENERGY 4

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list new ways man uses energy that were brought about by man's need for energy.

SUBJECT AREAS:

Social Studies, Art, Language Arts

7

## OPTION #1

### MATERIALS AND RESOURCES*

Marking pencils
3'x12' white paper
Reference books on different cultures and people

### PROCEDURE:

1. Introduce this unit by asking the children to draw pictures of modern man using energy in some ways.
2. Display their pictures.
3. Ask the students to think of ways energy was used by their grandparents, colonial settlers, and then work back to early man and his more basic uses of energy. Trace back at least one hundred years.
4. Using the paper and markers have the children draw pictures of man using energy from early times to now.
5. Display their mural.

### DISCUSSION QUESTIONS

1. What is energy?
2. Name some of our sources of energy.
3. Why have our sources of energy changed through the years?
4. Why have our uses of energy changed?
5. Name some new sources of energy that we may be using in the future.

### FURTHER ACTIVITIES:

Have the children look up new sources of energy.

*This option ties in very closely to Technology #6, option 3.

8

OPTION #2

MATERIALS AND RESOURCES

paper and pencil

PROCEDURE:

1. Take a fieldtrip to the site of an outdated use of energy such as Museum of Science and Industry, Chicago, or in the Antioch area, Ardis Anzinger's home.
2. Have the students roughly sketch what they see, i.e. a windmill.
3. Have each student make an ENERGY USE booklet. The booklet can be divided into sections: nuclear power, electricity, wind, water, fossil fuel, wood.
4. Have students put their sketches in the booklet and any other pictures they can find.
5. Make certain the pictures are put into a timeline.

DISCUSSION QUESTIONS

1. Ask the children to describe what they saw.
2. Discuss how the windmill or other object viewed was used.
3. Why is the windmill not popular now?
4. What has replaced the windmill?
5. How could we use a windmill now?

OPTION #3

MATERIALS AND RESOURCES

Cardboard boxes
Paints
Construction paper
Scissors

PROCEDURE:

1. Begin with a discussion of energy and its story through the years.
2. Let the children choose an energy use topic and base their dioramas on it.
3. Allow sufficient time for them to construct their dioramas.
4. Display dioramas.

DISCUSSION QUESTIONS

1. When do you think the uses of energy displayed were used?
2. Which dioramas show the oldest use of energy? How old do you think it is?
3. Which are still being used?
4. Why are some of these displayed uses not common now?
5. Which energy will be used most in the year 2000?
6. Why do you think it will be that one?

10

# ENERGY 5

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list five forms of energy.

## SUBJECT AREAS:

Science, Art

## KEY WORDS:

Potential energy - energy stored

Kenetic energy - energy released or put to use

Sources of energy - fossil fuel, hydroelectric, chemical, solar, nuclear, and geothermal

OPTION #1 - Fall or spring

MATERIALS AND RESOURCES

Film projector and screen
Wind and What It Does, North Lake County Film Co-op
Sketching materials

PROCEDURE:

1. Take the students to a local creek or pond area.
2. Observe insects and other animal life that fly, swim in water and move about on shore or bank.
3. Experience the sensations of solar energy and movement of air or wind. Observe water movement caused by wind or animals.
4. Notice movement of motor vehicles on local streets or in the air.
5. After showing the film, discuss energy cycles as to how any and all animal life has received its energy from its original source.
6. Make sketches of types of energy and the steps needed to make it useful for us.

DISCUSSION QUESTIONS

1. What forms of energy did you see?
2. What kind of interdependence can you make out of the life you were able to observe?
3. What are fossil fuels and how did they develop?
4. How is the energy of the wind used by man?
5. How is the energy of water harnessed by man?
6. What are some new forms of energy that we are trying to develop?

12

OPTION #2 - Fall or spring

## MATERIALS AND RESOURCES

A trip to a bog is suggested:

Cranberry Slough Nature Preserve, West of Route 45 and south of 95th Street, Cook County Forest Preserve

Volo Bog, two miles northwest of Volo on Brandenburg Road

Wauconda Bog Nature Preserve, south of Wauconda on Rand Road (limited access)

Dried peat moss
An electric burner
A piece of coal
An aluminum pie plate

## PROCEDURE:

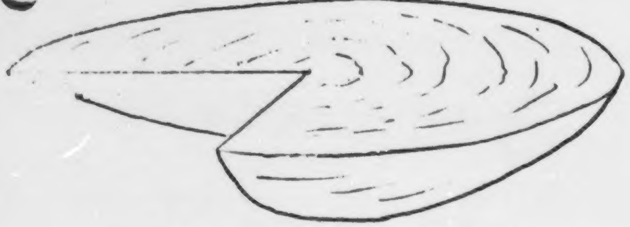
1. Arrange to take a field trip to a bog.
2. Have the students do some research to learn how coal, peat, petroleum, natural gas, and other fossil fuels are formed. In class discuss where they are stored and how they differ from other forms of energy.
3. Have two students report to the class on how bogs are formed. (See chart 1)
4. Visit the bog with your class. Have the conservation officer talk about the particular bog.
5. Also have the conservationist show them what peat looks like and what sphagnum moss looks like.
6. Upon your return to the classroom, burn some peat in the aluminum pie plate.
7. Also burn a piece of coal.

## DISCUSSION QUESTIONS

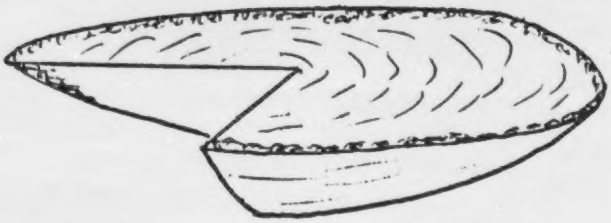
1. Where does coal come from? Where is coal formed? How was it formed?
2. How was peat formed? Where is peat found?
3. What conditions are necessary for the formation of peat?
4. Before sphagnum moss died, what did it need in order to live?
5. All fossil fuels can be traced back to what form of energy?
6. Since fossil fuels store the sun's energy, what can we conclude about the sun?
7. What other forms of energy are there?
8. What will we use if our fossil fuel runs out?

13

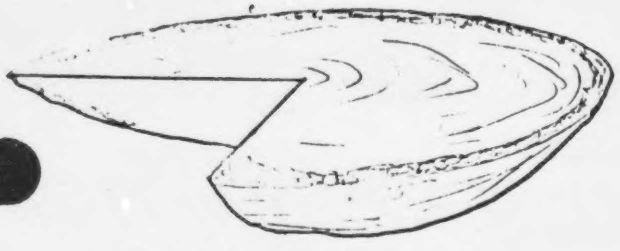
# SUCCESSION IN A BOG



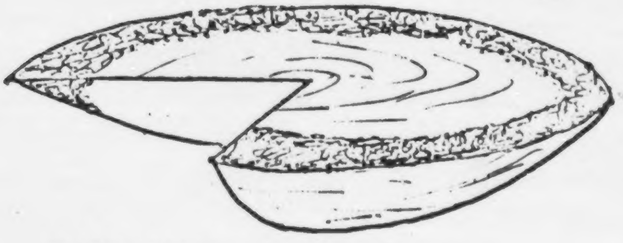
FIRST STAGE - submerged plants on lake floor near margin



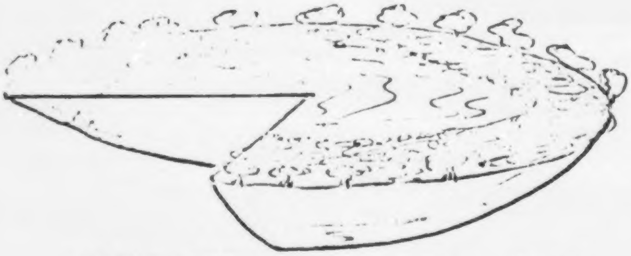
SECOND STAGE - floating-leaved plants along margin



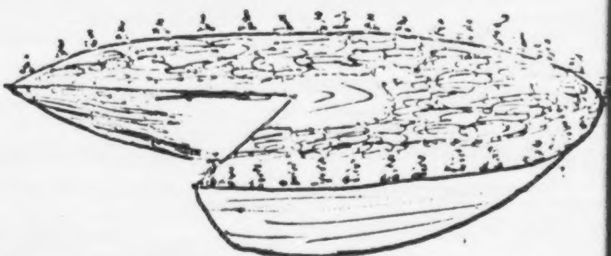
THIRD STAGE - thin floating mat composed of plants that tolerate having their roots always in water



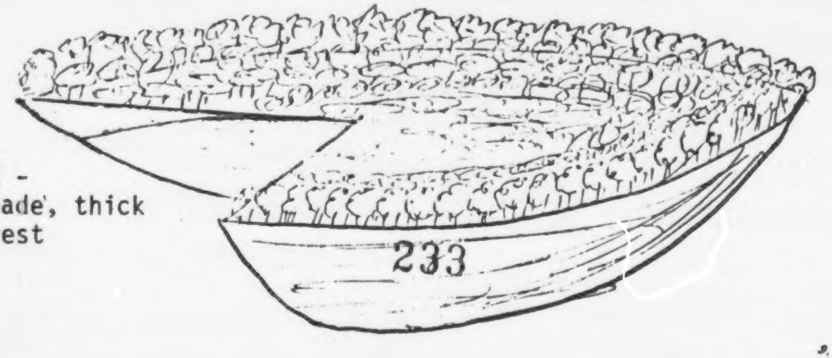
FOURTH STAGE - thickening mat plants that do not tolerate having their roots always in water



FIFTH STAGE - poor aeration, shrubs, carnivorous plants



SIXTH STAGE - shade, tamarack trees, root hummocks



SEVENTH STAGE - more dense shade, thick mat, rich forest

OPTION #3 - no specific materials

PROCEDURE:

1. Turn the lights off, and heat if possible, in the classroom.
2. Ask the children to think of a life with no electricity, even to the point of imagining the life of early man.
3. Have them sketch forms of energy used by early man.
4. List uses for current forms of energy.

DISCUSSION QUESTIONS

1. Why did early man need energy other than his own?
2. What causes the development of any sources or forms of energy?
3. Which forms of energy do you use?
4. Which sources of energy do you use?
5. What sources of energy did Early Man use?

15

## ENERGY 6

### BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list the effects on the environment of converting energy to meet man's needs.

### SUBJECT AREAS:

Science, Social Studies

6

## OPTION #1

### MATERIALS AND RESOURCES

A resource person from a nuclear power plant
For example: George A. Travers, executive assistant
Commonwealth Edison Company
One First National Plaza
P. O. Box 767
Chicago, Illinois 60690

### PROCEDURE:

1. Contact a resource person and arrange to have a speaker come to the classroom to speak about a nuclear plant and its effect on the environment.
2. This should be followed with a question and answer session.
3. Let the students write individual short reviews of what they have learned.

### DISCUSSION QUESTIONS

1. What is the reason for going to nuclear energy?
2. What are the possibilities of contamination from the plant?
3. What precautions are being taken to prevent problems?
4. Would you like to live near a nuclear energy plant? Why or why not?
5. Could you name a more efficient energy that could be converted to electricity? If so, what is it?

### FURTHER ACTIVITIES

Take the children on a field trip around the nuclear energy plant.

7

OPTION #2

MATERIALS AND RESOURCES

Ecology: Poster Cards - Milton Bradley Company, available $E^2$ Office (cards 4, 7-11, 17, 18, 20)

PROCEDURE:

1. Show the cards to the class one card at a time.
2. Follow each card with discussion questions on the back of the card.

DISCUSSION QUESTIONS

1. What general thing might have caused the setting?
2. What form of energy is this related to or the result of?
3. What might happen in the future if this continues?
4. How does this affect you?
5. Could the form of energy be changed to a cleaner form?

8

OPTION #3

## MATERIALS AND RESOURCES

Candle and holder
Matches
White plate

## PROCEDURE:

1. Light the candle and let it burn.
2. Hold the white plate over the candle and let the residue settle on the plate.
3. Have the children observe the experiment.
4. Now repeat the experiment with wood, lighter fluid, propane, alcohol, etc.

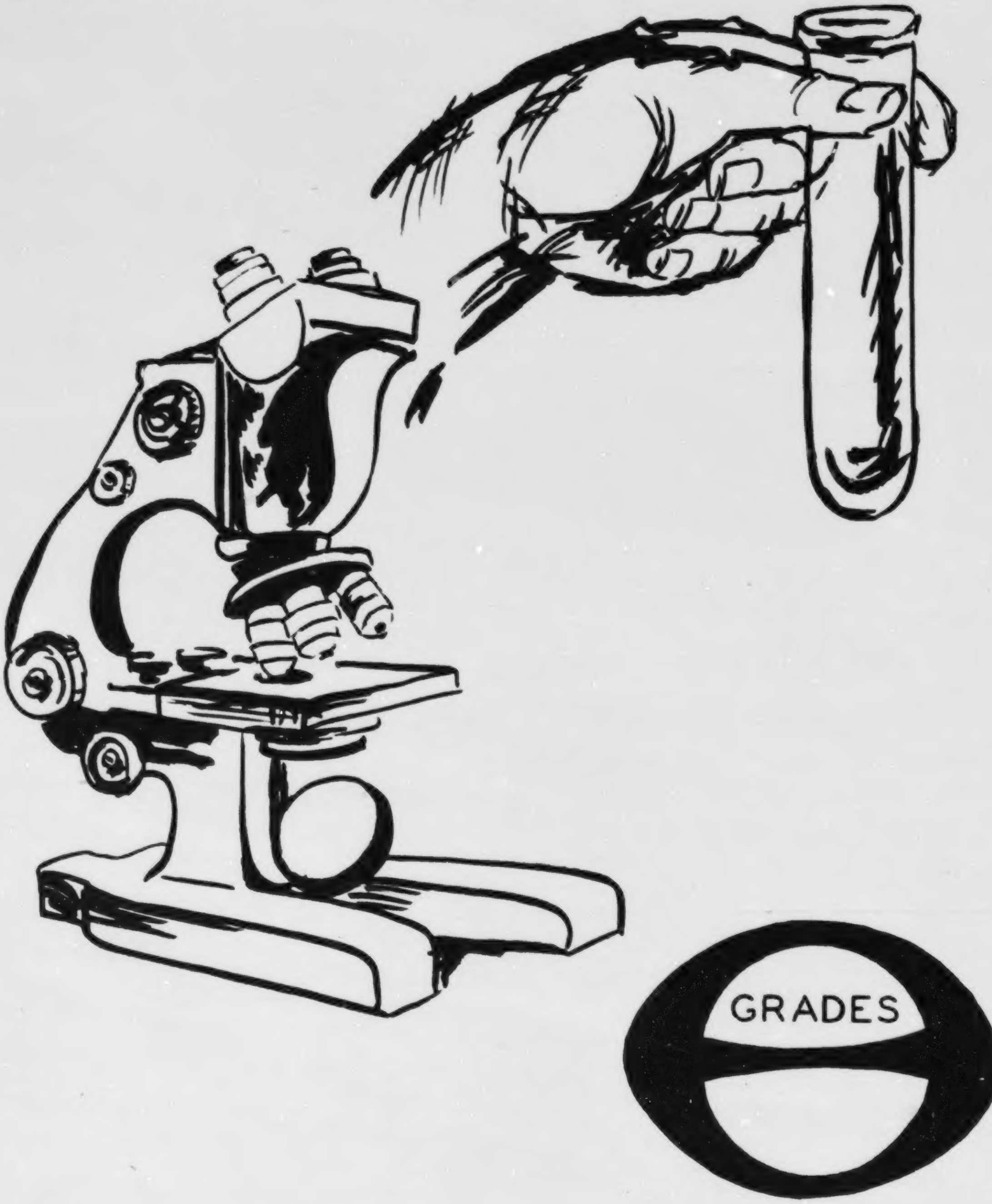
## DISCUSSION QUESTIONS

1. What good do candles do?
2. What happens to the air as the candle burns?
3. What is on the plate?
4. Does this affect our lungs?
5. What do other fuels do to the plate?

## FURTHER ACTIVITIES

1. Show a film on air pollution
2. Have the students do one of the ecology crossword puzzles, available $E^2$ Office.

# TECHNOLOGY



GRADES

## ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34
TITLE IVC ESEA

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Technology 7, Option 2 - Spring or Fall .......... 26

Synopsis

Technology 4: At the completion of this unit the student will be able to give examples of the good and bad effects produced by technology.

Option 1 - Students use the film, "Turn Off Pollution", to learn about air pollution. .. 3
Option 2 - Students view the film, "Automania", to examine the good and bad effects of the auto. .. 4
Option 3 - Students study the failure of the Teton Dam to understand good and bad effects of water control. .. 5

Technology 5: At the completion of this unit the student will be able to identify what effects his life has on the amount and type of industrial growth that takes place.

Option 1 - Students research various occupations to find out occupations are interrelated. .. 11
Option 2 - Students identify the kinds of places they would like to live in and not like to live in. .. 12
Option 3 - Students distinguish between rubbish from useful and useless items. .. 14

Technology 6: At the completion of this unit the student will be able to contrast the rate of technological advancement in the past several years.

Option 1 - Students make inventions to see how one invention leads to many more. .. 17
Option 2 - Students examine their use and their parents' past use of electricity to see how technology has lead to an increase of luxuries. .. 18
Option 3 - Students study the development of tools briefly from cave man to the industrial revolution to learn what particular inventions cause the greatest amount of change and development. 20

Technology 7: At the completion of this unit the student will be able to interpret the effects of lifestyles on the consumption of natural resources.

Option 1 - Students study family recreational habits to determine what resources are necessary for them. .. 24
Option 2 - Students examine the materials we use in various buildings to determine the use of natural resources. .. 26
Option 3 - Students examine the destination between luxuries and necessities. .. 27

## EXPLANATION OF CONCEPT AREA

TECHNOLOGY - Our vision of technology as a pure good that has brought man from primitive times to our modern lifestyle without major difficulties must be expanded to include the negative aspects so that we can understand the danger of taking technology for granted.

In the beginning we deal with the idea of work and our personal needs as supplied by technology.

We then progress to the rate of change of technology and its influence upon our lifestyle and environment.

The students then explore the timeline of technology and how technology is related to the use of resources. Technology is also examined for its effects on the environment.

In high school students examine the role of technology in the development of demand and its relationship to social costs and trade-offs.

## TECHNOLOGY 4

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to give examples of the good and bad effects produced by technology.

SUBJECT AREAS:

Science, Social Studies, English, Art

2

Option #1 - Allow advance preparation time to check with the custodian to see when burning takes place.

## MATERIALS AND RESOURCES

Movie projector
Movie - "Turn Off Pollution", North Lake County Film Co-op or other film on air pollution
Ringelmann Charts, one per student - available from Wards Natural Science Establishment, Inc.

## PROCEDURE:

1. Show the film.
2. Take the class outside for a walk about the school at a time when the furnace is beginning or trash is being burned. Let the class see and smell the area affected.
3. Use the Ringelmann charts to measure the degree of the pollution.
4. If possible take the students to a city where air pollution from smoke stacks is easily seen.

## DISCUSSION QUESTIONS

1. Does our school burn trash?
2. If so, what objects are burned?
3. If not, why not?
4. Does the school furnace release heavy smoke? Why?
5. What good does the furnace do?
6. What good does the burning of trash do?
7. Is the smoke harmful? How?
8. What could be done to eliminate the bad (smoke pollution) and keep the good (heat and disposal of wastes)?
9. Are we discussing forms of air pollution?

3

## OPTION #2

### MATERIALS AND RESOURCES

*Automania*, film from $E^2$ Office

### PROCEDURE:

1. Show the film.
2. Have the students write what they think the point of the film is, what idea is coming across.

### DISCUSSION QUESTIONS

1. Why do people want different types of cars?
2. How did the scientist and technology meet these needs?
3. How did civilization change as a result of these changes?
4. When the cars piled up and could not move what kind of changes did people want?
5. What kind of car did the people now desire? Why?
6. What are the good effects of the car?
7. What are the bad effects of the auto?
8. Who is responsible for the situation, the people or the scientist?

## OPTION #3

### MATERIALS AND RESOURCES

News article on the Teton Dam
Information sheet on the building of a dam
List of dams

### PROCEDURE:

1. Familiarize yourself with the building of an earthen dam. See information sheet.
2. Explain to the students how dams are built.
3. Have the students research the value of dams (flood control, reservoir, hydro-electric power, recreation). Have them select individual dams and try to learn why the dam was built and if it met its purposes.
4. Have the students read or read to them the enclosed articles on the Teton Dam.

### DISCUSSION QUESTIONS

1. What are the risks involved in the building of a dam?
2. What are the values of dams?
3. Can the values be achieved in any other safer way?
4. Do you think the other ways are more or less expensive?

5

OPTION NO. 3 - NEWS ARTICLE -
"Vast Flood Spewed by Broken
Dam Ebbs"
Removed prior to being shipped
to EDRS for filming due to
copyright restrictions

OPTION NO. 3 - NEWS ARTICLE -
"Blue Monday: Idaho's Dam Victims in Cleanup."
Removed prior to being shipped to EDRS for filming due to copyright restrictions.

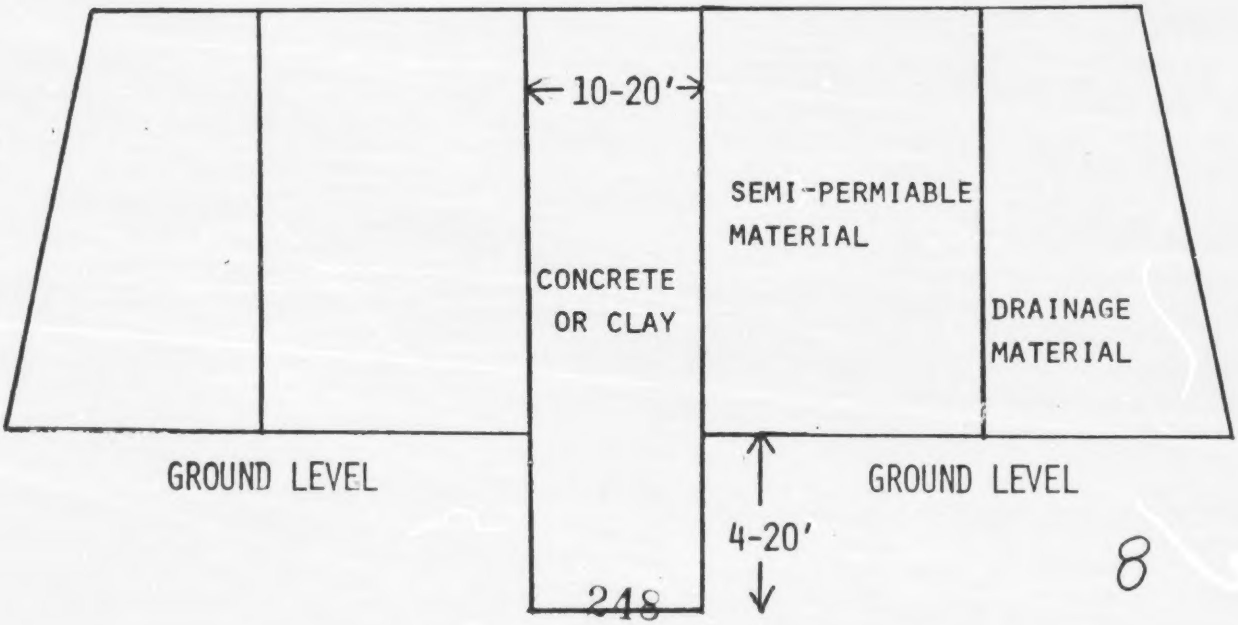
OPTION # 3 INFORMATION SHEET

THE INSIDE CORE IS BUILT OF CONCRETE OR HIGHLY COMPACTED CLAY DESIGNED TO BE NON-POROUS. THE CORE IS SET INTO THE GROUND FOR SUPPORT AND TO PREVENT SEEPAGE. BUILT AROUND THIS CORE IS A LAYER OF SEMI-PERMIABLE MATERIAL. THIS IS LESS EXPENSIVE THAN THE CORE AND IS DESIGNED TO KEEP THE WATER FROM THE CORE. NEXT TO THIS IS THE DRAINAGE LAYER. THIS IS POROUS MATERIAL DESIGNED TO HELP DRAIN MOST OF THE WATER AWAY FROM THE DAM CORE.

DAMS ARE BUILT OF LOCAL MATERIALS. AN EARTHEN DAM CAN BE AS STRONG AND EFFICIENT AS A CONCRETE DAM. IF AN AREA HAS A LOT OF CLAY, AN EARTHEN DAM IS BUILT. IF ROCK IS PLENTIFUL, A ROCKFILL DAM IS BUILT. IF NEITHER OF THESE MATERIALS IS AVAILABLE OR IF THE JOB IS TO LARGE, CONCRETE IS USED.

ANY OF THESE DAMS CAN BE USED FOR FLOOD CONTROL, RESERVOIRS, RECREATION, OR HYDRO-ELECTRIC POWER.

FURTHER INFORMATION CAN BE OBTAINED FROM THE ARMY CORP OF ENGINEERS.



OPTION # 3

# LIST OF DAMS

| | |
|---|---|
| KENTUCKY DAM | KY |
| WILSON DAM | KY |
| PICKWICK LANDING | KY |
| WOLF CREEK | KY |
| WATTS BAR | TENN |
| VAN LEAR | KY |
| FANTANA | N.C. |
| GLEN CANYON | ARIZ |
| APACHE LAKE | ARIZ |
| NAVAJHO | ARIZ |
| BLAKLEY MOUNTAIN | ARK |
| SAM RAYBURN | TEXAS |
| BLUE MESA | COLO |
| SMITH MOUNTAIN | VIRG |
| HARTWELL | GEO/S.C. |
| WALTER GEORGE | GEO/ALA |
| COLUMBIA | GEO/ALA |
| PALISADES | IDAHO |
| NORRIS | TENN |
| MELTON HILL | TENN |
| TULLAHOMA | TENN |
| RED ROCK | IOWA |
| PERRY | KANSAS |
| HAUSER LAKE | MONT |
| FORT PECK | MONT |
| YELLOW TAIL | MONT |
| HEBGEN | MONT |
| CLARK CANYON | MONT |
| CANYON FERRY | MONT |
| SWIFT | MONT |
| HUNGRY HORSE | MONT |
| FRESNO | MONT |
| RUBY | MONT |
| MADISON | MONT |
| FORT RANDALL | S.D. |
| KINGSLEY | NEB |
| DIVERSION | NEB |
| HOOVER | NEV |
| GARRISON | N.D. |
| OAKE | S.D. |
| BIG BEN | S.D. |
| JAMESTOWN | N.D. |
| HEART BUTTE | N.D. |
| DICKSON | N.D. |
| ANGASTURA | S.D. |
| CLEAR LAKE | CALIF |
| BUCHANAN | TEX |
| SANFORD | TEX |
| WHEELER | ALA |
| GUNTERSVILLE | ALA |
| DALE HOLLOW | TENN |
| CENTER HILL | TENN |
| HALES BAR | TENN |
| CHICKAMAUGA | TENN |
| HIWASSEE | TENN |
| DOUGLAS | TENN |

# TECHNOLOGY 5

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify what effects his life has on the amount and type of industrial growth that takes place.

SUBJECT AREAS:

Science, Art, Social Studies, Language Arts

10

## OPTION #1

### MATERIALS AND RESOURCES

Pictures of various occupations

### PROCEDURE:

1. Have the students discuss various jobs their families have. Make a list of the blackboard and next to that list the goods and services produced by the jobs.
2. Find pictures to represent the variety of jobs one might have. Display them on a bulletin board area.
3. After dividing into groups of four, have the students choose the job their group would like. Each group would choose a different job. Appoint a secretary for recording the information for presentation.
4. Make a list of resources used in making the equipment or vehicle used in the job. Research in the library to find out where the resources come from. Also make a list of resources used to get you to the job site and back.
5. Continuing with your research, find tools used to get these resources, what man has to do with them before they can be used, and how these resources finally reach you in a finished product.
6. Appoint a spokesman and present your results to the group.

### DISCUSSION QUESTIONS

1. What things are necessary to do in these various occupations?
2. What resources were needed to make the equipment?
3. Where did each resource come from?
4. Were people able to do the same activities 100 years ago?
5. Did they use the same resources?
6. What happens to the occupation when the resources run out?
7. What other occupations depend on the chosen one?
8. Are there any occupations that can be performed totally independent of resources?

### FURTHER ACTIVITIES

1. Write a play concerning the information found.
2. A group could represent their families' occupations with a mural.
3. Make a map showing where the resources come from and the transportation used in getting the resource to the finished product.

11

## OPTION #2

### MATERIALS AND RESOURCES

A variety of old magazines
Large sheets of poster paper
Scissors for each student
Cellophane tape or library paste

### PROCEDURE:

1. Provide each student with two pices of poster paper.
2. Ask the children to imagine the kinds of places they would like to live in as adults and to think of what those places would look like. Have them make a collage.
3. Ask them to also think of those kinds of places in which they would not like to live and make a collage of that.
4. Have them look through the magazines for pictures which remind them of the nice places. These should be cut out and saved in one pile.
5. Now have them look for pictures which remind them of the bad places. These should be cut out and saved in a second pile.
6. They now can make two collage posters, one of good place pictures and another of bad place pictures.
7. Have each child make a list of ten things he would like to have in his nice place (a dog, a car, a stereo, a bicycle, etc.).

### DISCUSSION QUESTIONS

1. What is it about your nice place that makes it so nice to think about?
2. What makes your bad place so unpleasant?
3. In what ways does everyone agree on the good and bad things?
4. On your lists of things you would like to have in your nice place, pick out the things that are made in a factory.
5. Now pick out the things that man does not have to make.
6. Do you have more man-made things or more things that man cannot make on your list?
7. What happens when a lot of people want things that can only be made in factories?
8. Would your nice place still be nice if a factory had to be built next to it?
9. How can everyone have the nice place he would like to live in?

12

## OPTION #3 - five days

### MATERIALS AND RESOURCES

Six paper bags for group work
One paper grocery bag for each student
Data table for each student

### PROCEDURE:

1. Take a walk around the schoolyard and collect litter. Put it in a bag to be taken back to the classroom.

2. The students are divided into six groups when they get back to the classroom. In their small groups they will decide together to:

   a. Divide the throwaways into two piles
   b. Classify the throwaways into two groups as to their usefulness and uselessness.

3. The students will collect all their classroom throwaways for three days and put them into a large grocery bag.

4. The students will collect as many throwaways as they can from home and put them in their bag.

5. Distribute the data table and have the students tally on their chart the number and kinds of throwaways they have collected during the week's time.

6. Provide a space on the chalkboard or large chart in front of the room to tally the total classroom findings.

7. Bring out the fact that a decrease in production could cause unemployment for people.

### DISCUSSION QUESTIONS

1. What kinds of things have been used and thrown away?

2. What kinds of things have been used most and thrown away by the whole class? Look on a large room chart and discuss the data.

3. How could their families use less throwaways?

4. What might happen if less of these materials were used?

5. Discuss why they used more of one kind than another.

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OPTION #3

## DATA TABLE

| Papers | Plastics | Aluminum | Other |
|---|---|---|---|
| | | | |

## DATA TABLE

| Papers | Plastics | Aluminum | Other |
|---|---|---|---|
| | | | |

# TECHNOLOGY 6

## BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to contrast the rate of technological advancement in the past several years.

## SUBJECT AREAS:

Penmanship, Art, Science, Social Studies, Language Arts

## OPTION #1

### MATERIALS AND RESOURCES

Drawing and construction paper
Pencils and painting supplies
A bulletin board display of machines (optional)

### PROCEDURE:

1. Begin with a discussion of machines, what they do, why and if the machine is necessary.
2. Make suggestions as to inventions of the future.
3. Have children design their own inventions and explain their function on paper.
4. Have the class choose some of the most original inventions and discuss the possibilities.
5. Now have the children decide what will be needed to improve or aid the class inventions: For example, the auto created a need for stoplights and stimulated the invention of windsheld wipers.
6. Bring out the fact that one invention leads to others.
7. It would now be possible to chart out the expansion of ideas from one invention.

### DISCUSSION QUESTIONS

1. How does one machine make other new machines necessary?
2. What invention has caused other new inventions?
3. Have all machines been good for people? Why or why not?
4. Have all machines been good for nature? Why or why not?
5. Why did man make machines to begin with?
6. Can you think of what may have been the earliest invention?

### FURTHER ACTIVITIES

1. The class may do a study of prehistoric man and his needs - how he invented simple machines as he needed them.
2. Make a timeline of inventions.
3. Have the children build their inventions out of scrap materials.

## OPTION #2

### MATERIALS AND RESOURCES

Chart of "Things that use Electricity", one for each student
Pictures or catalogs of appliances

### PROCEDURE:

1. Have the students make a collage of electrical items.
2. Distribute the charts and ask the children to complete the first and second columns with parental help.
3. A class period should be devoted to completing the third column by thinking and naming inventions. Illustrations are optional.

### DISCUSSION QUESTIONS

1. What are some things you have that your parents did not have?
2. Why didn't they have these things?
3. Why do you want the things you have put down under "What I Want To Have"?
4. How did the use of electricity change over the past twenty years?
5. What do you feel are necessary items?
6. Did your parents have them?
7. Why do you need them?

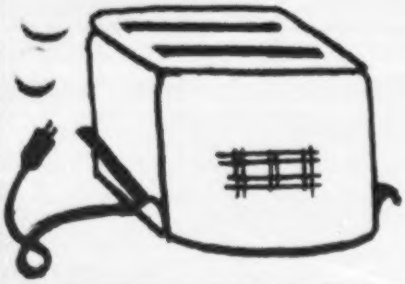
### FURTHER ACTIVITIES

The children could make drawings of their inventions, possibly even blueprints.

OPTION #2

## THINGS THAT USE ELECTRICITY

| PARENTS' CHILDHOOD | IN MY HOME TODAY | WHAT I WANT TO HAVE |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |



## OPTION #3 - Spring or fall

### MATERIALS AND RESOURCES*

Man's Use of Power Through the Ages, filmstrip, Inquiry Audio-Visual
Bulletin board area and background paper to cover it
Display of books showing technological development
Display of simple inventions such as a wheel, small tools, or appliances that would enhance the unit

### PROCEDURE: (spread over the entire year)

1. This unit should begin with the study of early man and his discoveries of fire, rocks, and sticks tied into weapons, etc. Students are to research the various types of tools made by early man. At this point a group of children could be assigned to prepare a large bulletin board with a timeline. The date of those early developments could be written on the paper with the name of the development or invention.

2. During the course of studying man his agricultural and technological advancement are also covered. The teacher will have to distinguish between the tools needed for hunting societies and those needed by agricultural societies. Two major concepts must be explained: The changes brought about by the agricultural revolution and the changes brought about by the industrial revolution.

3. As many inventions as possible should be marked on the timeline. Spacing by time will show the approximate length of time between inventions and it will be very obvious to the student that the frequency of inventions is rapidly increasing. Of course, not every invention since the industrial revolution can be plotted and discussion will indicate which inventions are the most important. When done in this way, this unit could last until nearly the end of the school year.

### DISCUSSION QUESTIONS

1. What were man's first inventions?

2. How close together were these inventions in time?

3. What is the significance of the agricultural revolution?

4. What is the significance of the industrial revolution?

5. What conveniences do we have now that people did not have 100 years ago?

6. How much time is there between these recent inventions and inventions in man's early times?

7. Can you think of any things that you would like that we do not now have? List them.

8. Do you think that the rate of technology is going to slow down? Why or why not?

OPTION #3 con't

FURTHER ACTIVITIES

Ask the parents and grandparents to list the inventions that were marvels to them.

RESOURCES

Inventions That Made America, kit, Multi-Media Products, 1971, AUGS

The City, filmstrip, N. Lake County Film Coop, 1973-74

The Farm Community, filmstrip, N. Lake County Film Coop, 1973-74

Industrial Revolution in England, film, N. Lake County Film Coop

Man's Way from Cave to Skyscraper, Linton, Harper and Brothers, New York, 1974, chapter 4

*This unit ties in closely with Energy 4, option #1.

OPTION NO. 3 "Learning to Farm"
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to EDRS for filming due to
copyright restrictions.

# TECHNOLOGY 7

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to interpret the effect of lifestyles on the consumption of natural resources.

SUBJECT AREAS:

Social Studies, Art, Language Arts

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## OPTION #1

### MATERIALS AND RESOURCES

Pictures
Pencils, pens and paper
Recreation ditto

### PROCEDURE:

1. Discussion of recreation in the family.

2. Find pictures of recreational activities. Arrange to display them on a bulletin board or have the children make a poster to put up.

3. Divide into groups. Have each group choose one type of recreation children would like. Have them find out the following:

    a. What kind of equipment is used for this recreation?
    b. How did this recreation originate?
    c. Where did material for equipment used come from?

4. Have the students make a chart of all the raw materials needed for that recreational activity.

5. Present the material to the groups with charts, graphs, or pictures.

### DISCUSSION QUESTIONS

1. What do your parents do for enjoyment?

2. What do you do in your spare time?

3. What equipment do you use for the things you do in your leisure time?

4. How can your recreation turn into an occupation?

5. Where do you get your equipment? Where did the store get the equipment? What raw materials were used to make the equipment?

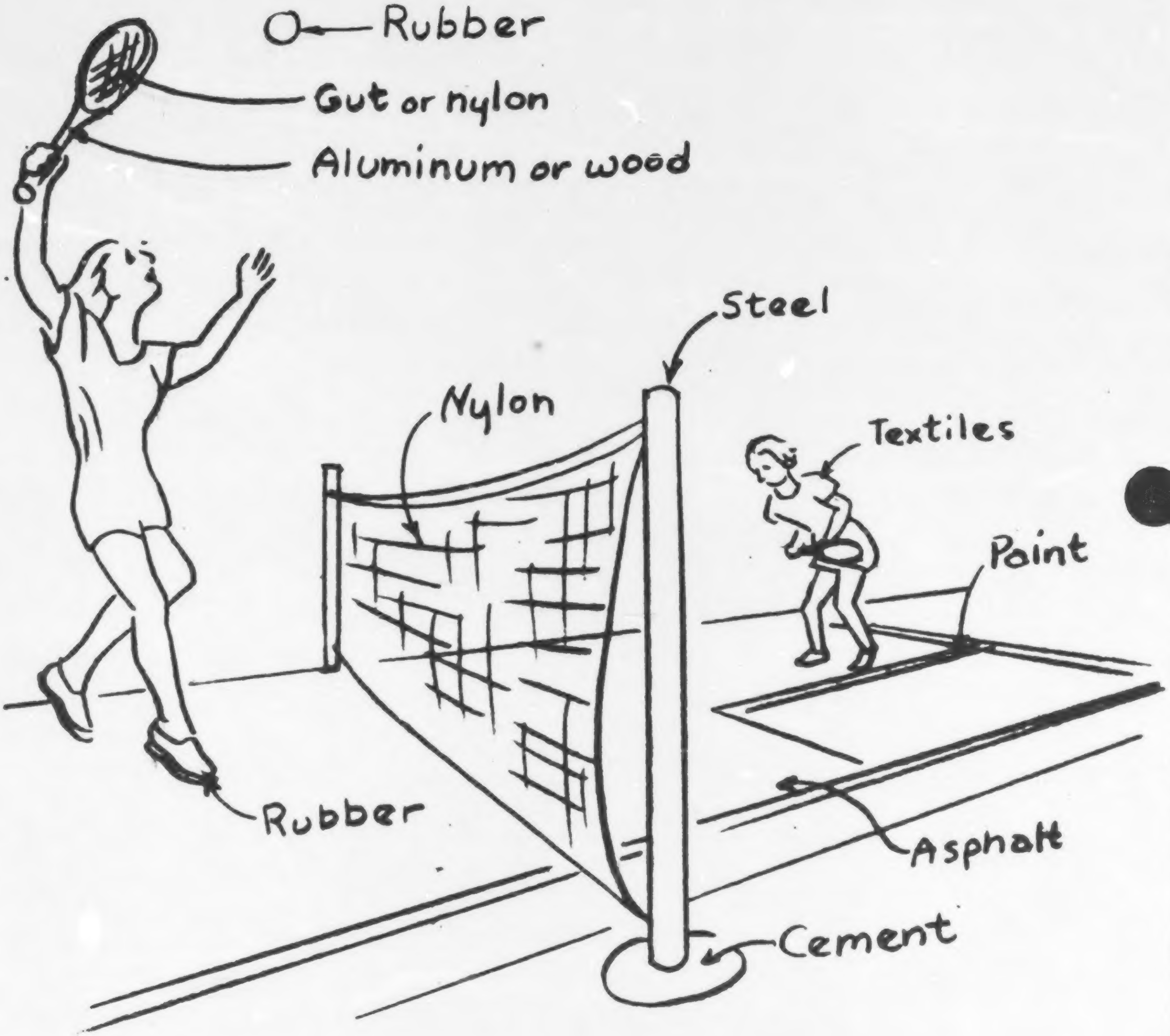
6. How could you make your own substitute equipment? For example: hockey puck - tin can

7. Where else might those raw materials be used?

8. If there was a shortage of those raw materials, how would it affect you?

OPTION #1

DITTO


Rubber
Gut or nylon
Aluminum or wood
Steel
Nylon
Textiles
Paint
Rubber
Asphalt
Cement

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OPTION #2 - Spring or Fall

MATERIALS AND RESOURCES

New building under construction

PROCEDURE:

1. Visit a house under construction.
2. Gather samples of materials used in the house construction or have the children observe all materials that go into it.
3. Have research done on construction materials used by Indians in building their homes.
4. Have someone find materials used in houses on the prairie.
5. Compare various materials by use of a wall chart.
6. Determine if the materials are our own or if they are bought from other countries.
7. Locate on a map where raw materials for building come from.

DISCUSSION QUESTIONS

1. What type of home is most difficult to build?
2. What happened to resources the Indians used to build their homes? The houses on the prairies?
3. Which home takes more human energy to build? Why?
4. Which home takes more mechanical energy?
5. What will happen to modern construction if raw materials cannot be transported to the site?
6. What would happen to a modern builder if he could not get materials such as copper wiring, plumbing, etc.?

## OPTION #3

### MATERIALS AND RESOURCES

Blackboard
Pictures for posters
Glue and scissors

### PROCEDURE:

1. Discussion - What is a luxury?
2. Have children collect pictures and make a collage of luxuries or posters of luxuries.
3. Have a child choose two luxuries he has in his home.
4. Find out what these things are made of.
5. Have the child write a report or build a poster of resources. Put luxury in the middle and place the resources in a circle around it.
6. Have children decide what one luxury they would like to keep by pretending that all luxuries would be taken away and that they could keep only one. Have the children tell why they want that one.

### DISCUSSION QUESTIONS

1. What is a luxury?
2. What is the difference between it and a necessity?
3. When does a luxury become a necessity?
4. Who in our society has more luxuries? Why?
5. Why do we need many resources for luxuries?
6. If all natural resources were taken away, what would become of our luxuries?
7. What happened during the energy crisis? Did people cut out their luxuries?
8. What necessities can be made from the materials in your luxury?

### TEACHER NOTE:

This unit can be followed by Economics 6, Option 3.

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